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UNIT Trucks were designed to overcome all of the common failures of the conventional brake rigging.

Unit Truck Side Frames have integral guides protected by wear plates, the top guides being removable to permit interchange with conventional break beam.

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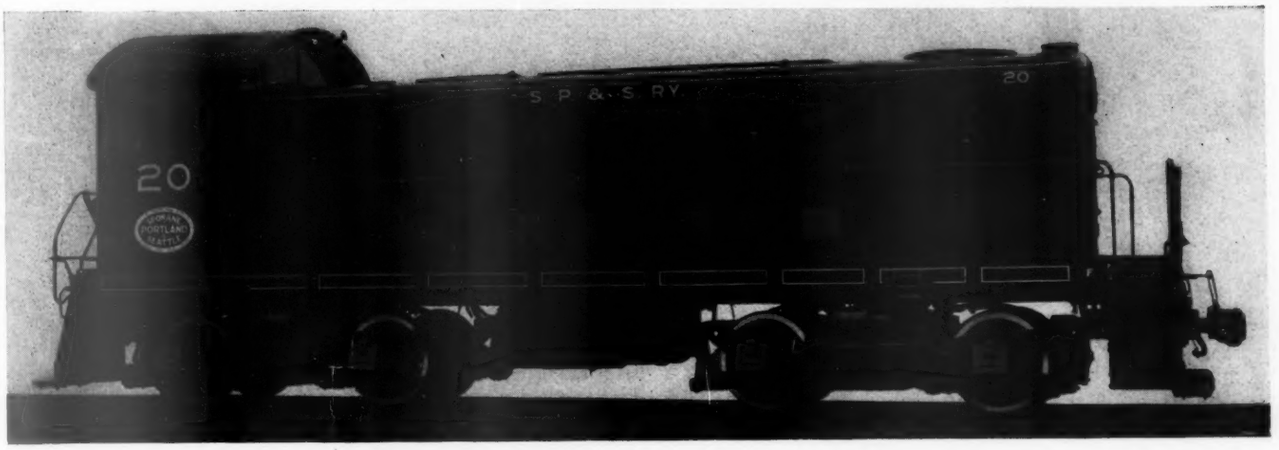


One of the Alco 1,000-hp. Diesel-electric switching locomotives

Improved Visibility and Auxiliaries Drive Feature

Alco Diesel Switchers

For some time the American Locomotive Company has been making deliveries on 660-hp. and 1,000-hp. switchers of a design in which the visibility has been greatly increased and general appearance improved. Several changes have also been made resulting in simplification of the operation of auxiliaries. The lower engine hood has been made possible by dropping the Diesel engine down into the locomotive underframe. The power plant and auxiliaries are located under the hood with the engine at the center and the radiator at the front. Part of the hood is removable and ventilation is obtained by louvres in hatch doors. In the case of the 1,000-hp. turbo-charged engine air is drawn in through a filter mounted on the hood. On the 660-hp. engine the filter is on the engine.

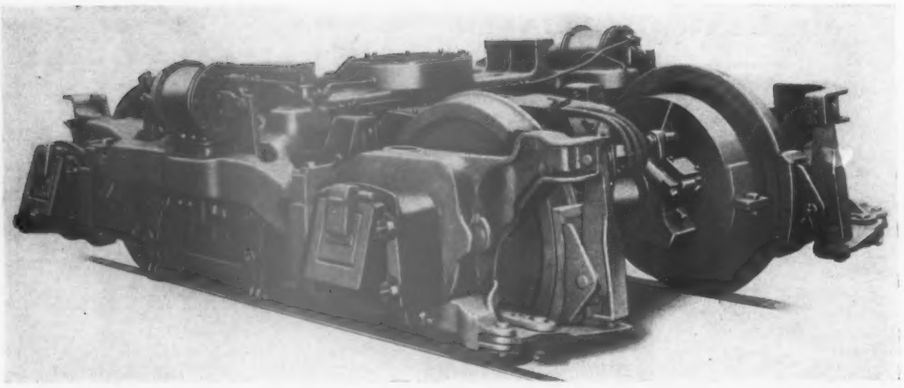
The locomotives are rated 660 and 1,000 hp., respectively, and all electrical equipment, except the main generators, is identical. In previous designs, the auxiliary generator was mounted on the main generator shaft. In these, all auxiliaries, except the air compressor, are driven by V-belts from sheaves on the main shaft. Formerly the air compressor was motor-driven by power from the auxiliary generator and, in the new locomotives, it is on the main shaft. These changes permit the use of a smaller auxiliary generator and exciter and allow the engines to idle at 250 r.p.m., thereby saving approximately one gallon of fuel oil per hour. The compressor output is 76 cu. ft. per min. at idling speed and 228 cu. ft. per min. at full speed (740 r.p.m.).

Traction motors have large thermal capacity, those on the 660-hp. unit being rated at 740 amp. and those on the 1,000-hp. unit, 830 amp. The increased rating on the larger locomotive is obtained by increasing the volume of the cooling air; 750 cu. ft. per min. on the smaller and 1,200 cu. ft. per min. on the larger one. Maximum speed restriction is 60 m.p.h.

General Features

The general structure of these locomotives consists of a welded steel underframe on cast-steel swivel trucks, a low narrow hood and an operator's cab at one end. The engine, radiator compartment, generator, auxiliary generator, air compressor and contactors are all located under the hood. The engine is in the center section, with the radiator compartment at the front.

Maximum visibility is obtained with the low, narrow hood



The trucks are equipped with clasp brakes and are reversible under the locomotive to equalize tire wear

The windows in the cab are exceptionally large and there is a very narrow section between the windows. Visibility is further improved by an elevated operator's seat. The cab is heated by an automotive type of water heater.

The Diesel Engines

The 600- and 1,000-hp. Diesel engines are alike except for the addition of a turbo-charger* in the latter type. The increased amount of air supplied by the turbo-charger permits more fuel to be burned per stroke and acts as dilutent, with the result that the full-load exhaust temperature of the turbo-charged (Buchi system) 1,000-hp. engine is only 800 deg. F., while that of the 660-hp. engine is 895 deg. F.

The water- and oil-cooling radiators are of the sectional core type. The radiator fans are V-belt-driven from the engine and shutters are applied outside of the radiators and are operated by a control in the cab. To maintain a nearly constant load on the radiator fan, by-pass shutters are located inside the radiator compartment. They are so arranged that a corresponding graduated movement of the by-pass shutters occurs automatically with a movement of the outside shutters. When the outside shutters are closed, the by-pass shutters are open, and vice versa. This allows complete control of the degree of cooling desired.

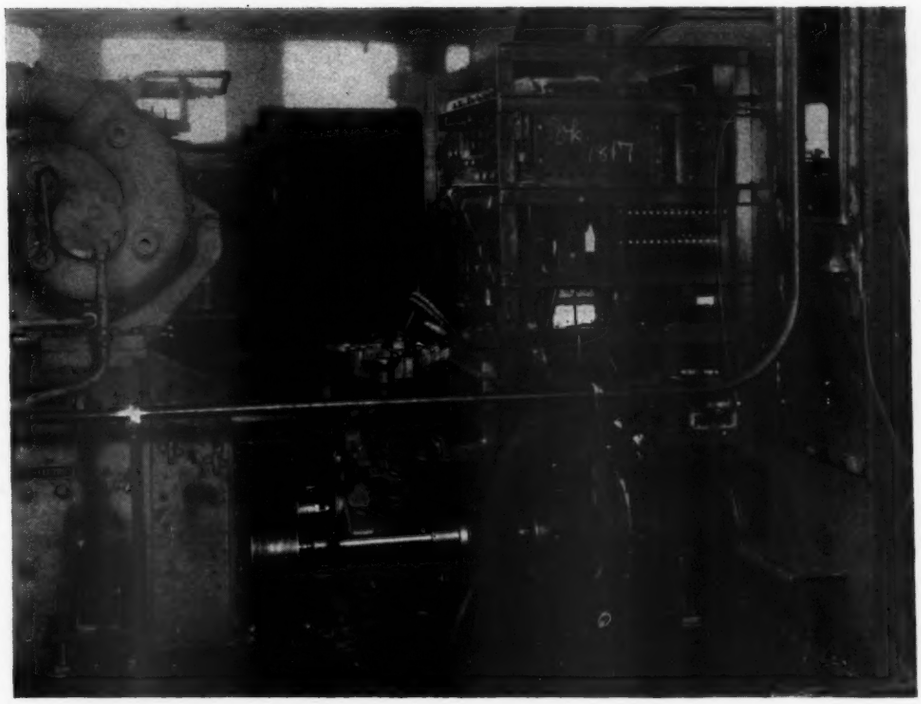
Electrical Equipment

The electrical equipment is built entirely by the General Electric Company. It includes the main traction generator, a belt-driven exciter auxiliary generator, 4 GE-731 series traction motors and complete Type P control equipment.

The main generator is supported by the engine frame and two spring-loaded feet attached to the generator frame. This construction insures alinement between the engine and the generator armature. A single self-alining roller bearing is used at the outboard end of the armature shaft. The auxiliary set consists of a split-pole exciter which furnishes excitation to the main generator and an auxiliary generator which supplies power for the

* A detailed description of the Alco (Buchi system) turbo-charger appeared in an article in the August, 1937, issue of *Railway Mechanical Engineer*, page 339. The results from this system of supercharging were summarized in the August, 1938, issue, page 297.

The Alco turbo-charged 1,000-hp. Diesel engine

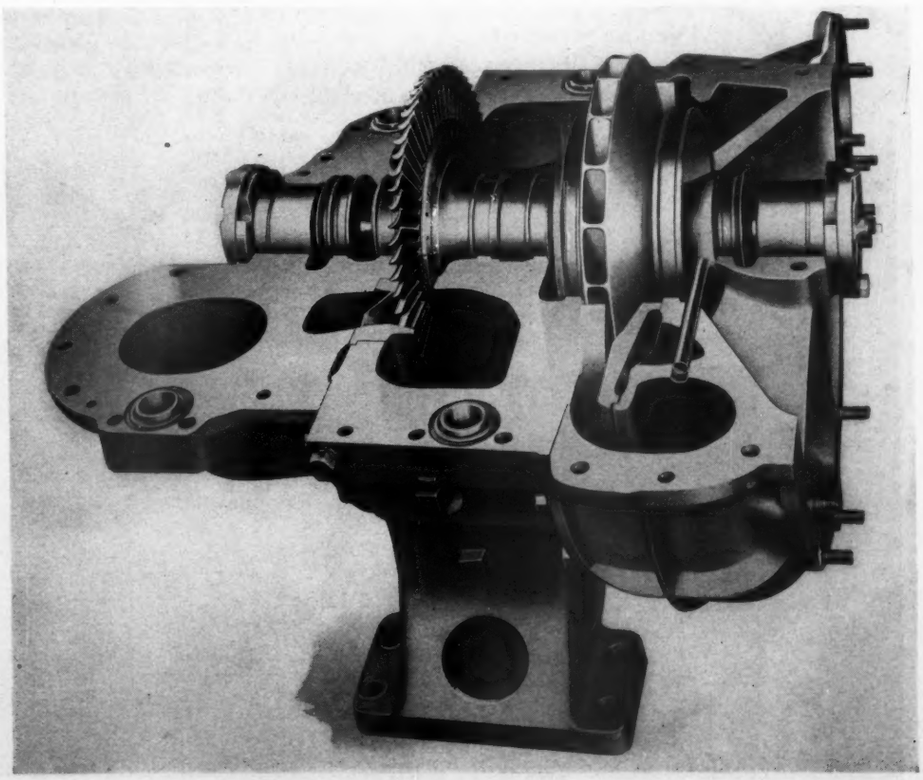


The compressor and exciter are at the rear of the engine and are driven by V-belts

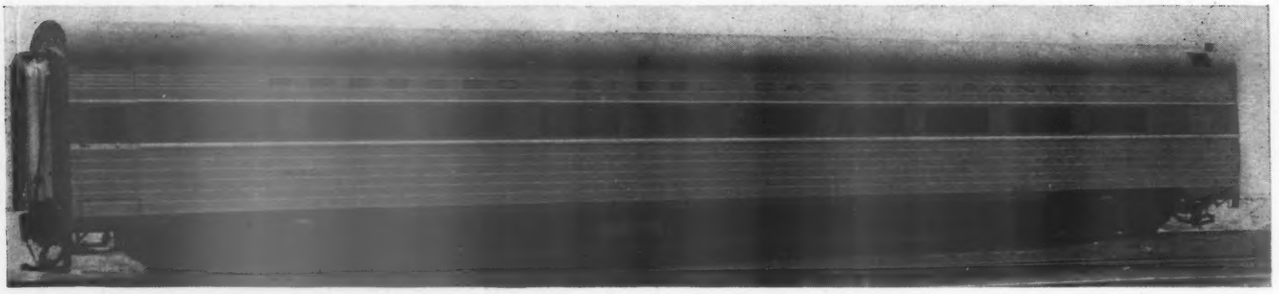
control circuits, the electrically operated auxiliaries and for charging a 32-cell battery. The armatures of the two machines are on the same shaft. The main generator furnished power for the four direct-current commutating-pole traction motors which are permanently connected two in series for series and series-parallel operation. These motors are supported in the locomotive truck by sleeve-type axle bearings and spring-nose suspension from the truck frame. The motor armature bearings are the roller type. The armature shaft has ample rigidity and is so installed that it can be removed without disturbing the windings or commutator. The motor frame is an integral steel casting and has large openings for inspecting brushes.

The Type P single-end, single-unit control functions with a minimum of attention from the engine operator. Power supplied by the engine is applied by means of a throttle lever on the control stand at the engineer's position. The initial movement of this throttle closes con-

(*Continued on page 385*)



Alco (Buchi System) turbo-charger with the top casing removed



De Luxe passenger coach now on exhibit at the New York World's Fair

Pressed Steel Builds

DeLuxe Passenger Coach

Richly upholstered seats and mirror walls are the distinctive factors in the achievement of an unusual interior effect—Body construction of USS Cor-Ten steel

THE Pressed Steel Car Company has developed a deluxe passenger coach, now on exhibit at the New York World's Fair, in which several innovations of design and appointments combine to produce an unusually pleasing and attractive result. The interior appointments were designed in collaboration with Lurelle Guild, New York.

In designing this car a partially streamlined effect was obtained by making the exterior surfaces as smooth as possible. The car is built of Cor-Ten steel and while it is generally of riveted construction, the center sills are welded to a steel buffer casting. The car has been designed to meet the present A. A. R. requirements as to strength. It more than met the required longitudinal compression-load test of not more than one-half to three quarters inch vertical deflection with 800,000 lb. end load. It was subjected to 926,000 lb. with a vertical deflection of only 0.49 in. with no permanent set after the release of the pressure.

The Car Structure

The center sills consist of rolled A. A. R. Z-bar sections with a continuous weld in the center. The center sill is lower than usual, bringing it more in line with the buffing forces and resulting in a stronger structure. The bolster diaphragms, crossbearers, etc., are of pressed pan shapes. The side posts are pressed U-shapes with rolled-section side sills and side plates. The belt rail is covered with a moulding to conceal the rivets. The floor consists of Keystone flooring with cork base cemented thereto, on top of which Linotile flooring is applied. This floor is supported by longitudinal continuous steel floor stringers which, in turn, are supported by the cross members

Interior of the Pressed Steel coach photographed by its own illumination

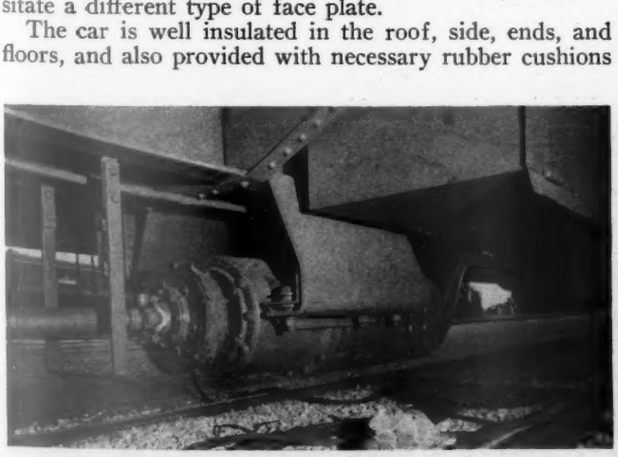
The seats are spacious and upholstery on the arm rests and ends adds richness to the appearance of the car

of the underframe. A false floor is provided below the floor stringers and the space between the false floor and the Keystone floor is insulated. The vestibule floor is of Alcoa tread plates.

The roof is of the turtle-back type. The carlines supporting the roof sheets are partly of channel shape and partly of Z-bar pressed shape. The roof sheets are riveted to the carlines and the lap joints are made watertight by proper grade of Alumilastic cement instead of welding.

The car has a platform on one end, with O. M. Edwards combination folding steps and trap door. The other end is blind construction. At this end are located the two saloons and necessary compartments for the electric equipment and air-conditioning equipment. The ends are not at right angles to the longitudinal center line of the car, as in many coaches built today, but are sloped in order to provide necessary clearance should it be desirable to install outside folding diaphragms instead of the flexible rubber-type diaphragms now frequently used. The car is now equipped only with inside diaphragms, but provision has been made for the application of an outside diaphragm, which, of course, would necessitate a different type of face plate.

The car is well insulated in the roof, side, ends, and floors, and also provided with necessary rubber cushions between the truck and body in order to arrest sound and vibration traveling from the truck to the body of the car.



The Safety Genemotor is suspended under the center sills

Interior Finish and Decoration

The inside finish is unusual in design. The distance from the car floor to top of the window sill is about 4 in. higher than usual in car construction in order to prevent passengers when traveling at high speed from looking down at the adjoining track. The greater width of the sash gives the passenger an exceptionally unobstructed view of the passing scenery.

The sash, consisting of two panels of glass, of which the inside is safety glass, are permanently fixed. The sash is in two parts. The part which holds the glass can be easily removed from the outside for replacement of glass in case of breakage. The inside of the window opening is covered with gun-metal-finish mouldings both for the window sill as well as the curtain guides. The shape of the window sill is such as to prevent passengers from using it as a shelf, thereby protecting the finish.

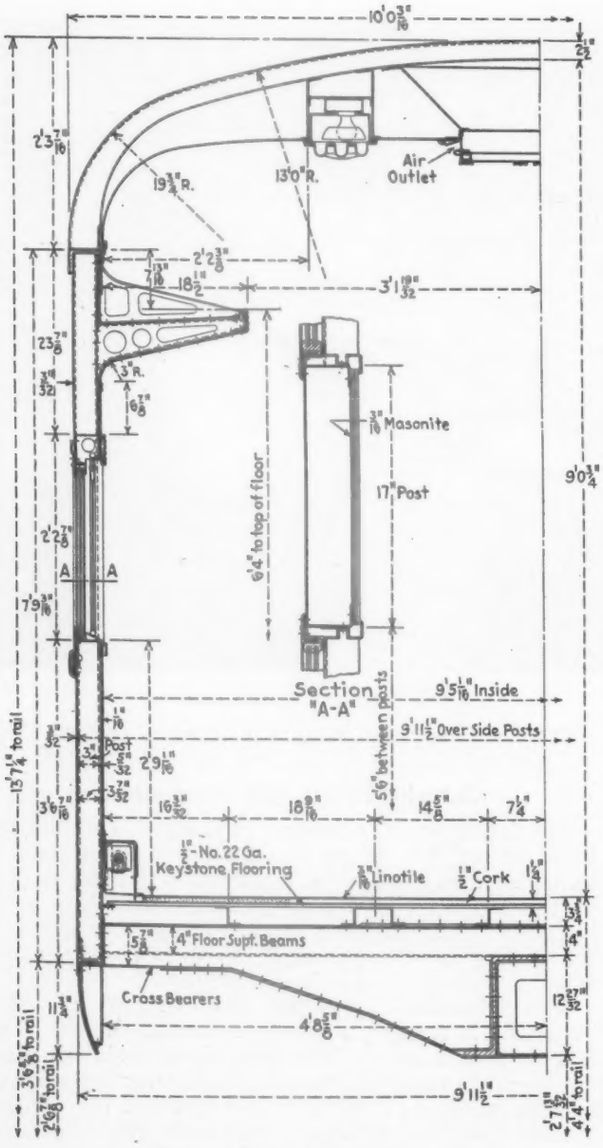
The curtain material was especially woven in order to have a color scheme to match the interior finish of the car. The curtains are equipped with cable fixtures and especially designed gun-metal-finish aluminum apron. This apron will prevent passengers from harming and handling the curtain material and the cable fixtures allow the passengers to open and close the curtain from any position. This is particularly desirable, since the width of the glass covers two seats.

The baggage rack is bone white, edged with aluminum, of the solid continuous type with the top covered with fluted aluminum sheets to allow easy cleaning. Brackets at intervals prevent shifting of baggage. There are no lights in the rack.

All mouldings are of extruded aluminum with Alumilite finish.

All posts from window sill to bottom of window header, as well as the ends of the car, both at the platform end and the saloon end are covered with gun-metal mirrors. The mirrors are cemented to a backing which will prevent glass from shattering in case of breakage.

The heater pipes are covered with perforated polished stainless steel.



A section of the car at the cross bearer

The seat fabric is mohair striped at the top to make the seats appear wider. The window shades pick up the color of the car—aluminum and green, in lateral stripes. The composition floor covering of black and cream tile is designed and styled so that the black marbleized pattern comes at intervals coinciding with the seats. A touch of aluminum color is used between the windows and the baggage rack and in the vestibule. Beneath the windows, as well as on the doors, a supporting substantial color is used—the same soft green-blue of the upholstery. The ceiling is painted bone white.

The exterior of the car is finished in matched warm gray tones, the roof of a darker color with bands between the windows of the same tone. The side walls are striped with aluminum, and at top and bottom of the windows are repeated notes in aluminum stripes.

General Weights and Dimensions of Pressed Steel Passenger Car

Length over buffer face plate, ft.-in.	84- 8
Truck centers ft.-in.	59- 4
Length inside of passenger compartment, ft.-in.	71- 4
Seating capacity	80
Width over side sheets, ft.-in.	9-11 11/16
Height from rail to top of roof, ft.-in.	13- 7 1/4
Distance from rail to skirting, ft.-in.	2- 6 7/8
Distance from rail to top of floor, ft.-in.	4- 4
Lightweight, lb.	111,200

Seating Arrangement

All seats are of the revolving, reclining, sliding-cushion type, furnished by the Coach & Car Equipment Corporation. They have double tilting footrests which add to the comfort and do not obstruct the passage between seats. Except for a few stainless-steel mouldings below the arm rest as a matter of protection of the covering, no metal is visible. The seats are covered with an especially woven Chase upholstery material of a blue-green color, the arm rest and ends all are covered with the same upholstery material which produces a rich looking seat. The seats have spring backs, whereas the seat cushions are rubber.

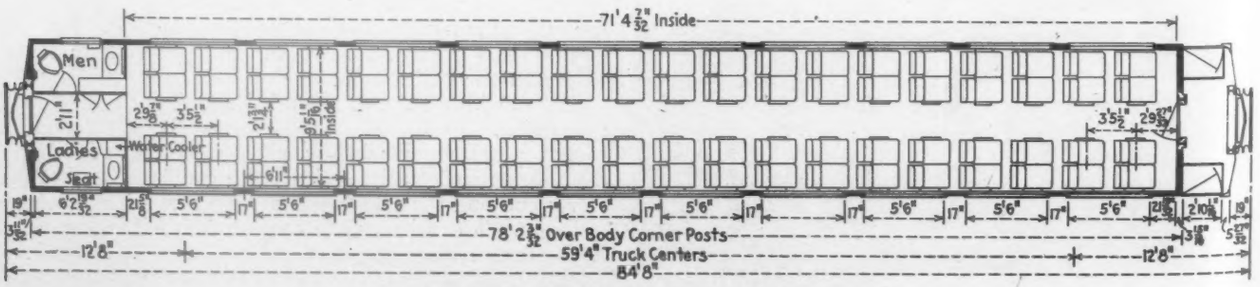
Lighting and Air Conditioning

The lighting system consists of lensed glassware mounted one over each passenger seat in two rows down the ceiling. A continuous trough is imbedded in the light fixture above the ceiling and this trough is covered by plastic ribs which appear to be a continuation of the glass design. When lighted, the plastic ribs take on a glow from the light thrown back by the continuous trough imbedded in the ceiling. The effect of a continuous lighting system is, therefore, accomplished although the light sources are only 40 watts and located directly above the lenses. Readings taken on a 45-deg. plane 30 in. above the floor at the center of each seat at rated voltage show a variation of 8 to 10 foot-candles.

Night lighting is furnished by blue bulbs in the trough located at points between fixtures. The magnifying lenses over each seat are so focused as to prevent glare on the passenger who looks forward or across the aisle and at the same time to prevent shadow on his reading matter.

The glassware and plastics are all hinged with sealed edges to prevent dust infiltration.

Power for light and air conditioning is obtained from a 20-kw. Genemotor made by the Safety Car Heating & Lighting Company, New Haven, Conn. It is driven from the car axle by a Super Gear drive supplied by the



The Pressed Steel coach has seats for 80 persons

Super Gear Corp., Chicago. The Genemotor may also be operated from 3-phase, 220-volt standby power through a Pyle-National, four-pole receptacle located at one side under the car. When the Genemotor is not operated or is running at low speeds, power is taken from a Gould KALD-35-R, 32-volt storage battery. It has an eight-hour rating of 1,000 amp. hr. and is mounted in two battery boxes on opposite sides under the car. Pyle-National receptacles are available on both sides of the car for receiving d. c. charging current from yard or station outlets.

Air-conditioning equipment was supplied by the Frigidaire Division, General Motors Corp., Dayton, Ohio, and is equipped with the correlative control of the Vapor Car Heating Co., Chicago. This company also supplied the steam-heating equipment. Exhaust fans were made by the Diehl Manufacturing Company.

The lights in the car are arranged on eight circuits. Four circuits feed alternate lights on each side of the car, two others supply the night lights, and the remaining two are used for washroom and passenger lights and vestibule lights at opposite ends of the car.

The car is equipped with General Steel Castings four-wheel trucks with bolster stabilizers and shock absorbers. Simplex Unit-Cylinder clasp brakes, with two brake cylinders, are mounted on each truck. The wheels are fitted with ASF roller-bearing units. Center pins are of the Miner locking type.

These cars are equipped with Westinghouse Air Brake Company's HSC brake with D-22-A passenger control valve. The coupler equipment is the National tight-lock type, and the draft gears, Miner A-5-XB. Barco steam train-line connectors are applied.

Principal Weights and Dimensions of Alco Diesel-Electric Switching Locomotives

	660 hp.	1,000 hp.
Length overall, ft.-in.	44- 5¾	45- 5¾
Width overall, ft.-in.	10- 0	10- 0
Height from rail, (max.) ft.-in.	14- 4	14- 6
Wheel base, rigid, ft.-in.	8- 0	8- 0
Wheel base, total, ft.-in.	30- 0	30- 6
Truck wheels, diameter, in.	40	40
Total locomotive weight, lb.	199,000	230,000
Weight on drivers, lb.	199,000	230,000
Starting tractive force, lb.	59,700	69,000
Maximum speed, m.p.h.	60	60
Minimum radius curvature, locomotive alone, ft.	50	50

Alco Diesel Switchers

(*Continued from page 381*)

tacts which operate the main circuit and field contactors. The traction-motor reverser and line contactors are pneumatically operated and the remaining contactors magnetically operated.

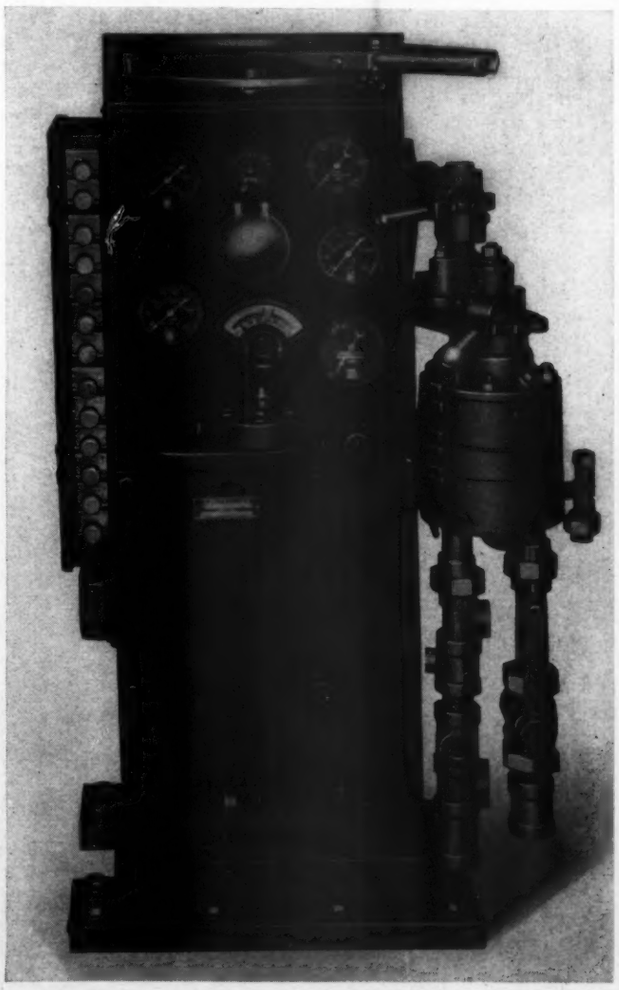
The traction motors are arranged to operate in series and series-parallel, and there are also connections for shunted-field operation. The motor connections are changed automatically from series to series-parallel and from series-parallel full-field to shunt-field operation.

Automatic transfers are provided not only at rated engine speed but over the entire operating range of the engine. The relay which effects this automatic control materially increases the engine utilization during partial control and as a result more rapid acceleration and higher average and top locomotive speeds are obtained when operated at reduced engine speeds. A current relay and indicating light give visible warning when the locomotive is operating below the proper speed range with the motors in the series-parallel connection. A wheel slipping relay with a buzzer also operates to warn the engineer when any pair of wheels slips.

The master controller is used to select the motor combination and the direction of movement of the locomotive. This controller has three forward, one off and three reverse positions. When the handle is placed in the third operating position before opening the throttle, the motor connections will then be changed automatically from series to series-parallel and field-shunting without attention on the part of the operator. If desired, the handle can be placed in the first forward or first reverse position so that it will maintain series connections of the motors. A multi-button switch at the operating stations gives the engineer control of the fuel pump, engine starting and the several lighting circuits.

The trucks are interchangeable and reversible, to equalize flange wear. The only difference between the trucks on the two locomotives is that heavier springs are used on the 1,000-hp. unit which is about 30,000 lb. heavier than the 660-hp. design. Clasp brakes are applied with a large bearing area and those on one truck may be hand-operated. The gear ratios on both locomotives are $^{16}/_{75}$ and the wheel diameters are 40 in. The maximum tractive force is 29,200 lb. for the 660-hp. locomotive and 34,000 lb. for the 1,000-hp. unit.

The Westinghouse air compressor is driven directly from the main shaft. It is a two-stage, air-cooled compressor with a capacity of 228 cu. ft. per min. at 740 r.p.m. The air brakes are Type 14-EL.



All controls are mounted on a stand convenient to the operator

Union Pacific

Fourteen-Wheel Tenders

Large capacity for length and weight, improved stability and easy riding properties are features of tender built on a combined truck and pedestal cast-steel bed

EXPERIENCE during recent years has shown that important operating economies result when locomotives are provided with tenders having increased coal and water capacities. Enginehouse stalls and turntables limit the total length of locomotive and tender and modern power requirements have increased the sizes of the locomotive proper to such an extent that the length of the tender is generally restricted.

The clearances of the right-of-way place a definite limit on width, and the height is governed by water and coal-loading facilities. This too often results in a short tender wheelbase and a high center of gravity.

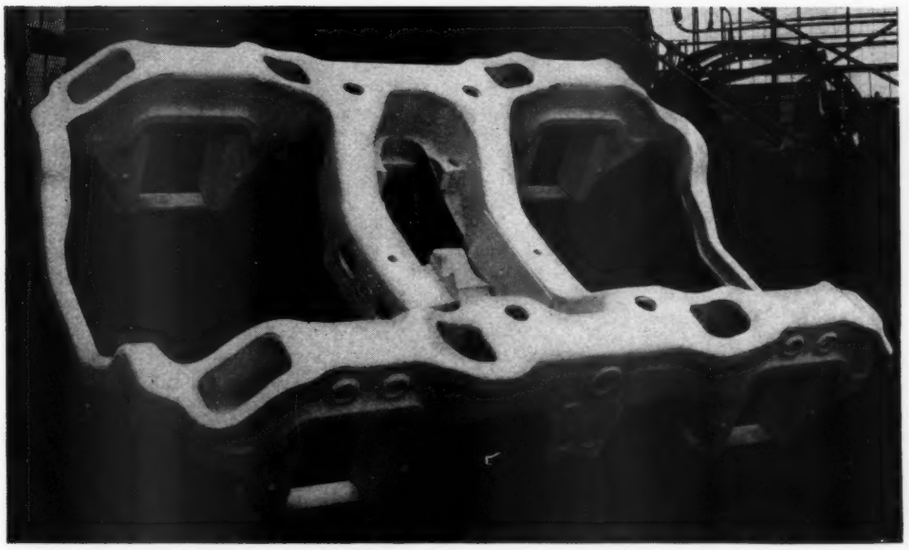
The use of two swiveling trucks, either six or eight-wheel, and providing for the required end clearances, in most cases brings about comparatively short truck centers and necessitates liberal side-bearing clearances. These factors tend to produce instability, considerable surge in the cistern, high spring maintenance and low wheel mileage between turnings.

Much thought has been directed to a solution of these problems, the demand for more coal and water, higher speeds and increased braking power, indicating that not only are more wheels required but larger diameter wheels as well, and generally improved construction are essential. One important improvement, commonly used for a number of years on American railroads, is the inclusion of the bottom of the tender cistern as an integral part of the cast-steel water-bottom tender frame, in this way utilizing the depth of the frame for water storage.

The decision of the Union Pacific to build large tenders having capacities for 23,500 gal. of water and 25 tons of coal for long runs and high-speed operation necessitated departures from conventional American tender designs. The increased capacities were to be obtained within an established total wheelbase larger diameter wheels, lighter rail loads per pair of wheels, more uniform weight distribution, and increased wheel mileage, with high-speed braking conditions. This new-type tender was also to incorporate improved riding qualities, better stability and lower track stresses than existing types of tenders which, up to this time on the Union Pacific, had utilized conventional six-wheel trucks on all large tenders.

The engineers of the Research and Mechanical Standards department of the Union Pacific, collaborating with engineers of the General Steel Castings Corporation, after a number of studies had been developed, decided upon a construction with a wheel arrangement similar to a 4-10-0 type locomotive with 42-in. diameter wheels throughout. A four-wheel swiveling, laterally-controlled,

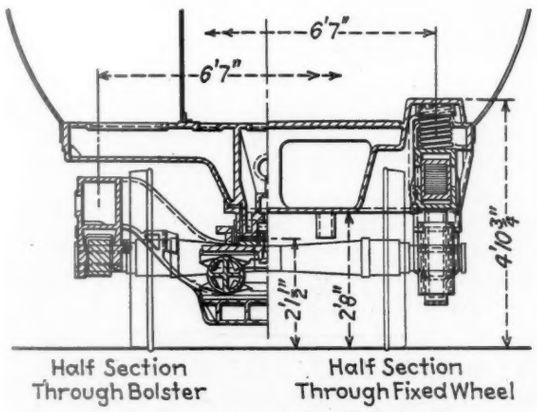
Union Pacific 14-wheel locomotive tender, equipped with Commonwealth cast-steel tender bed having integral pedestals for the five rear pairs of wheels



Commonwealth cast-steel front tender-truck frame arranged for renewable centering device used with tender bed

outside-bearing guiding truck was located at the forward end. Rearward of this were placed five pairs of wheels guided in pedestals cast integral with the water-botton tender frame, or as now designated, the tender bed.

The leading truck is the General Steel Castings Corporation four-wheel equalized type with a roller centering device designed for 17 per cent initial and constant resistance.



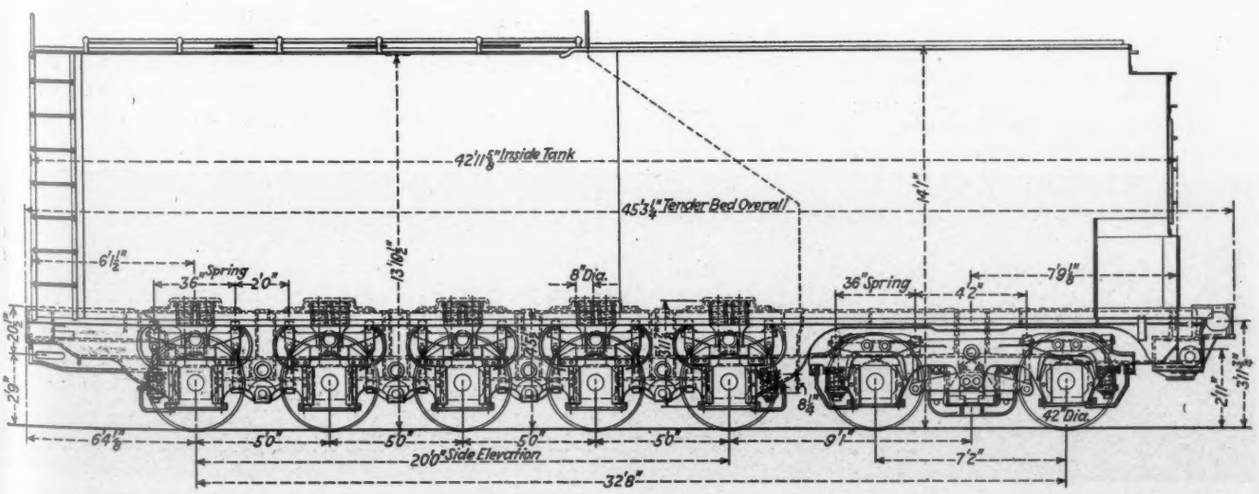
Half sections through the tender bed

The five pairs of pedestal wheels are equalized together, with one semi-elliptic spring and two coil springs over each of the roller-bearing journal boxes. The front and back end of each equalizing system is attached to the frame through cushioning coil springs. Between each box and the semi-elliptic spring saddle is a centering device to resist lateral movement.

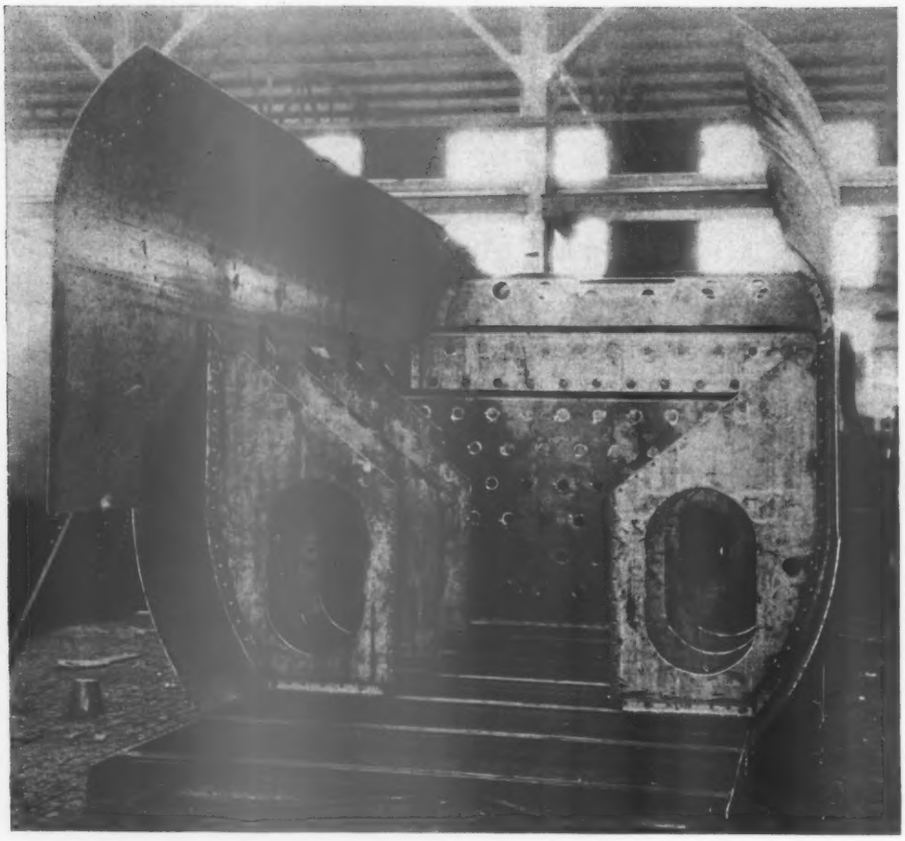
With spring rigging equalization, a three-point loading is obtained, one point being at the swiveling truck center plate and the other two points in the pedestal group equalization assembly.

Each pedestal of the fixed group has hardened spring-steel pedestal liners made up of two plates between which is bonded one-half inch of rubber, arranged to permit ½ in. of lateral movement of the box. Additional lateral is provided between the box and pedestal liner, permitting a total lateral movement of 1¼ in. on each side of axles Nos. 3, 4, 5 and 6, and ¾ in. on each side of axle No. 7.

This novel tender construction necessitated the development of suitable brake rigging. The American Steel Foundries, in collaboration with engineers of the Research and Mechanical Standards department of the Union Pacific and of the General Steel Castings Corpora-



Elevation of the Union Pacific 14-wheel tender showing the equalization system and the coil springs over each journal box



Interior of the tender tank showing general construction and arrangement of the splash plates

tion, developed a Simplex unit-cylinder clasp-type brake application for the lead truck employing two brake cylinders, one mounted on each side of the truck frame.

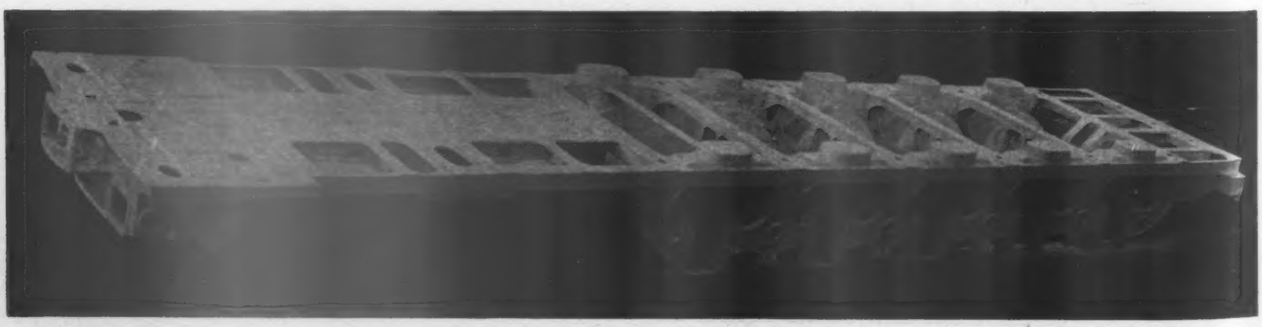
For the 10-wheel fixed group, clasp brakes were likewise used, each pair of wheels being braked by one brake cylinder suspended from the underside of the tender bed. All brake-rigging pins are fitted with elastic stop nuts and anti-rattling devices where practical. Two single brake shoes 15 in. long are applied to each wheel, reducing brake-shoe pressure per square inch. Large bearings with soft grease lubrication are utilized throughout the trucks.

The tender-bed casting has large openings opposite the semi-elliptic springs, equalizer pins and foundation

(*Continued on page 390*)

Partial List of Equipment on the Union Pacific 14-Wheel Tenders

Cast-steel tender bed and front truck frame	General Steel Castings Corporation, Granite City, Ill.
Steel forgings	American Locomotive Company, New York
Roller bearings (10)	Timken Roller Bearing Company, Canton, Ohio
(5)	SKF Industries, Philadelphia, Pa.
Simplex unit-cylinder clasp brakes	American Steel Foundries, Chicago
Air brakes	New York Air Brake Company, New York
Brake shoes	American Brake Shoe & Foundry Co., New York
Stoker	Standard Stoker Co., Inc., New York
Tender wheels and tank plate	Bethlehem Steel Company, Bethlehem, Pa.
	Carnegie-Illinois Steel Corporation, Pittsburgh, Pa.
Coupler	National Malleable & Steel Castings, Co., Cleveland, Ohio
A5XB draft gear	W. H. Miner, Inc., Chicago
Radial buffer and flexible steam heat connection	Franklin Railway Supply Co., Inc., New York
Stoker engine steam-line flexible connections	Barco Manufacturing Company, Chicago
Rubber pedestal liners and tank hose	U. S. Rubber Company, New York
Wovenstone steam-heat pipe insulation	Union Asbestos & Rubber Co., Chicago
Metallic steam conduit	Vapor Car Heating Co., Inc., Chicago
Tank valves	Crane Company, Chicago



The Commonwealth cast-steel tender bed showing details of the integral pedestal arrangement for the five rear pairs of wheels

Southern Pacific's Method for

Semi-Cross-Balancing

By Morris P. Taylor*

A substantial reduction in the overbalance of the main driving wheels is obtained by this method in which the cross forces acting on the other driving wheels are considered

IN counterbalancing locomotives in the United States, it is not customary to cross-balance driving wheels other than the main and sometimes the intermediate wheels, as it is usually considered that the cross-balance effects on these wheels are not large enough to be important. However, when these wheels are counterbalanced by the static method and the balance for the reciprocating parts is divided equally among them, it will be found that if the dynamic forces in each wheel are calculated allowing for the couples set up by the out-of-plane actions of the forces, the true dynamic augment is considerably less than when calculated by the static method.

The diagram in Fig. 1 shows the rail-loading conditions on a pair of intermediate wheels which are balanced statically with a nominal overbalance of 240 lb. In order to make the calculations complete, all static and dynamic forces on the rail have been taken into account so that the actual rail loads on both wheels have been calculated. The actual force causing dynamic augment is found to be 180 lb. opposite the pin, and 60 lb. at 90 deg. from the pin, or a resultant force of 190 lb. Thus, if a locomotive has the main driving wheels cross-counterbalanced correctly for the revolving forces with the remaining wheels balanced statically and the overbalance for the reciprocating parts distributed equally among all the wheels, the actual dynamic augment due to the overbalance will be the greatest on the main wheels. The following table shows typical values for a locomotive with eight driving wheels:

Coupled Wheels Statically Balanced

Wheel	Front	Main	Intermediate	Back
Overbalance, lb.	180	180	180	180
Forces producing dynamic augment, lb.:				
Opposite crank pin	159	180	120	159
Cross force	21	0	60	21
Resultant force	160.4	180	134.2	160.4

Total reciprocating balance per locomotive—720 lb.

The resultant forces are not equal, being greatest on the main wheels. This is just the opposite of the correct condition since the main wheels are subjected to additional forces by the steam action and the inertia of the reciprocating parts. Also, the main wheel assembly has the greatest unsprung weight, so its natural frequency of vibration is the lowest.

Assuming that 720 lb. of reciprocating balance per locomotive are necessary to insure smooth riding in this particular case and that it is desired to keep within the allowable limit of 180-lb. force causing dynamic augment per wheel, it is possible to use the following amounts of apparent overbalance in the front, intermediate and back wheels:

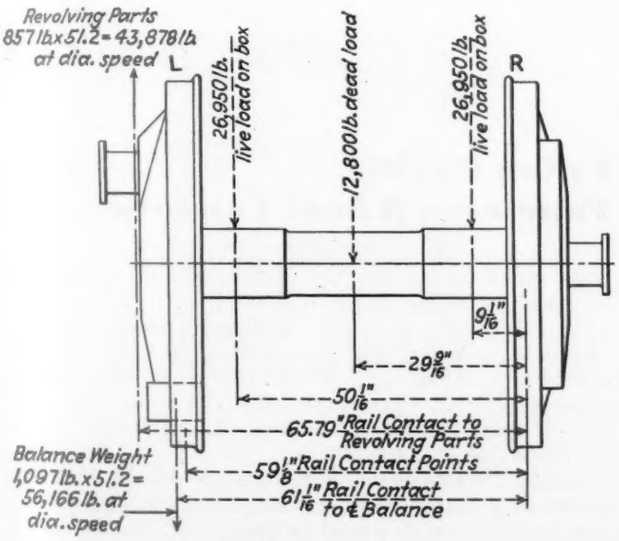
Overbalance, lb.:

Front and back $= \sqrt{(180)^2 - (21)^2} + 21 = 199$

Intermediate $= \sqrt{(180)^2 - (60)^2} + 60 = 230$

The derivation of this formula and the calculation of the maximum apparent overbalance to be used in the intermediate wheels are shown in Figs. 2. There is, of course, a small theoretical error in this derivation because the cross force, due to out-of-plane action, is computed by the usual method, neglecting the very small cross effect caused by the fact the overbalance is not in line with the point of rail contact. However, this error is within the shop limits of balancing, and has been neglected.

Now, if it is desired to keep within the limit of 720-lb. balance in the locomotive for the balance of the reciprocating parts, the main wheels need only have an overbalance of 720 — (199 + 199 + 230), or 92 lb. Thus,



Moments About Right Rail		Moments About Left Rail	
+26,950 × 9.06	= + 244,200	+43,878 × 6.67	= + 292,600
+12,800 × 29.56	= + 378,400	−56,166 × 1.96	= − 110,100
+26,950 × 50.06	= +1,349,100	+26,950 × 9.06	= + 244,200
+56,166 × 61.06	= +3,430,000	+12,800 × 29.56	= + 378,400
−43,878 × 65.79	= −2,886,700	+26,950 × 50.06	= +1,349,000
	2,515,000		2,154,100
2,515,000 ÷ 59.12	= 42,540 lb.	2,154,100 ÷ 59.12	= 36,430 lb.
Force on left rail	= 42,540 lb.	Force on right rail	= 36,430 lb.
Static load	= 33,350 lb.	Static load	= 33,350 lb.
Dynamic force	= 9,190 lb.	Dynamic force	= 3,080 lb.
Equivalent dynamic weight = 9,190 ÷ 51.2	= 180 lb.	Equivalent dynamic weight = 3,080 ÷ 51.2	= 60 lb.

Resultant dynamic weight $= \sqrt{(180)^2 + (60)^2} = 190$ lb.

Dynamic augment by static method = 240 × 51.2 = 12,290 lb.
True dynamic augment = 190 × 51.2 = 9,730 lb.

Fig. 1—Calculation of actual forces causing dynamic augment

* Office, general superintendent motive power, Southern Pacific Co.

by taking into account the cross forces on the wheels other than the main, it is possible to obtain the same fore-and-aft balance per locomotive, the same maximum dynamic augment per wheel from overbalance, and still reduce the balance in the main wheel from 180 to 92 lb. This is highly desirable, especially in locomotives having four coupled pairs of wheels.

With this method of semi-cross-balancing the reciprocating balance per locomotive is 720 lb., of which 618 lb. is on the adjacent side and 102 lb. is provided by the unbalanced cross forces on the opposite side. On the other hand, if the locomotive is cross-balanced on all the wheels, in the European manner, it would be necessary to increase either the force causing dynamic augment on the main wheels to 180 lb., or exceed the 180-lb. limit on the other wheels. Therefore, it is apparent that with the semi-cross-balancing method the blow on the rail per wheel is lower, but the "nosing" couple is greater than if all the wheels were cross-balanced. Modern locomotives of the 4-6-4 and 4-8-4 types have a high moment of inertia about a vertical axis and the restraints to "nosing" produced by the leading and trailing trucks and the chafing gear have such a powerful leverage that "nosing" is secondary to the problem of reducing the rail stresses under the main wheels. For any given amount of reciprocating balance, it appears that semi-cross-balancing of the coupled wheels offers the greatest relief from these stresses under the main wheels without exceeding any limitation of the force producing dynamic augment.

Referring again to Fig. 1, it is obvious that it is not necessary to include the dead and live loads in the calculations, as they are equally divided between the wheels. The general calculation is as follows:

Let

W_r = Weight of side rod on pin and the included part of pin, lb.

W_h = Weight of crank-pin hub and included part of pin, lb.

W_c = Weight of counterbalances (at crank-pin distance), lb.

d_1 = Distance, side rods to adjacent point of rail contact, in.

d_2 = Distance, crank-pin hub to adjacent point of rail contact, in.

d_3 = Distance, counterweight center to adjacent point of rail contact, in.

d_4 = Distance between points of rail contact, in.

Then cross force equals

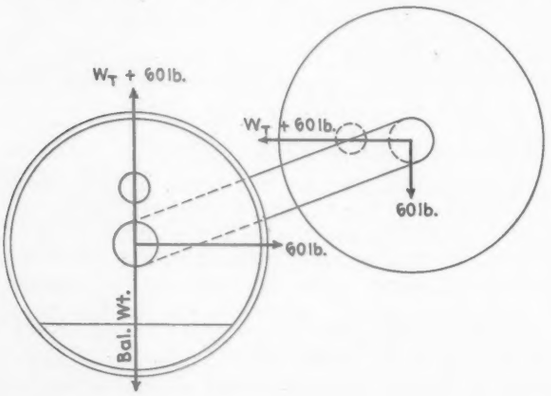
$$C = \frac{W_r d_1 + W_h d_2 - W_c d_3}{d_4}$$

and the force producing dynamic augment is

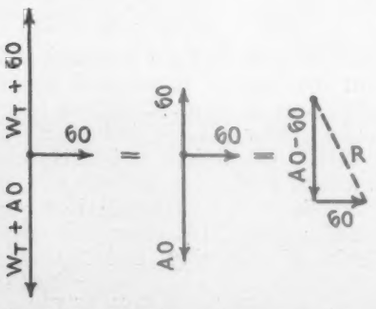
$$F = \sqrt{(W_c - W_r - W_h - C)^2 + C^2}$$

These two equations can be solved for W_c if F and the other weights and distances are known, but it is usually simpler to assume a value of W_c, calculate C and F, and adjust W_c to suit, as C does not change rapidly with W_c. In most cases C and F can be calculated within a few pounds by neglecting the distance between the balance center and the point of rail contact, that is, assume $d_4 = d_3$ and calculate the cross force by the usual A. A. R. formula for cross-balancing wheels.

This latter method was the one used in counterbalancing the recent order of 2-8-8-4 locomotives built for the Southern Pacific by the Lima Locomotive Works and described in the January issue of the *Railway Mechanical Engineer*.



Let W_t = Weight of revolving parts
Then W_c is calculated by usual A. A. R. cross-balance formula (A. A. R. manual, Section F, Pages 135-136—1932)
Cross force = $(W_c - W_t)$ taken as 60 lb. on intermediate wheels
Therefore, $W_c = W_t + 60$ lb. Force in adjacent balance plane due to revolving parts
Apparent overbalance = AO = Balance weight − W_t
Or Balance weight = $W_t + AO$
By vectors:



Resultant R = 180 lb. (Allowable limit)

$(180)^2 = (60)^2 + (AO - 60)^2$

$(AO - 60)^2 = (180)^2 - (60)^2$

$AO - 60 = \sqrt{(180)^2 - (60)^2}$

$AO = \sqrt{(180)^2 - (60)^2} + 60 = 230$ lb.

Fig. 2—Calculation of maximum apparent overbalance

Union Pacific Fourteen-Wheel Tenders

(*Continued from page 388*)

brake parts, which facilitate inspection and replacement of these parts, including the wheels.

This new type of construction made possible the elimination of a number of parts, thus reducing the total weight approximately 15,000 lb. below that of a conventional tender of equal capacity. The light weight of each of these tenders, as constructed, is 160,400 lb., and the loaded weight, 406,500 lb.

Tenders of this new design were built by the American Locomotive Company for service behind the 15 new 4-8-4 type locomotives, delivered to the United Pacific during August and September, 1939. Up to May 1, 1940, these locomotives have accumulated 1,866,786 miles and, during this period, the maintenance has been exceptionally low on both the locomotives and the tenders. The riding qualities are definitely better than with conventional tenders having two swivel trucks. Mileage between turning of wheel treads has been approximately double.

Present indications are that all requirements set up in the development of this new type of tender on the Union Pacific are being obtained in actual service.

* * *

THE DIONNE QUINTUPLETS recently appeared in a coast-to-coast radio program sponsored jointly by the Canadian National and the Canadian Pacific. The first sponsored radio appearance of the "Quints," the broadcast was one in a series of the "Canadian Holiday" program which the two railroads make possible.

Coordinated Associations Meet

Simultaneous conventions of Railway Fuel and Traveling Engineers', Car Department Officers, Master Boiler Makers', and Locomotive Maintenance Officers' Associations to be held at Chicago

Carl Harper, President

Master Boiler Makers' Assn.

A. F. Stiglmeier, Sec.-Treas.

THE four coordinated associations will hold their annual conventions at the Hotel Sherman, Chicago, simultaneously October 22-25, inclusive. This is the fourth successive year that these associations—the Railway Fuel and Traveling Engineers' Association, the Car Department Officers Association, the Master Boiler Makers' Association, and the Locomotive Maintenance Officers' Association—have held their meetings at the same time and place under arrangements made by a coordinating committee on which all are represented. For the second time there will be an exhibit of the Allied Railway Supply Association.

Following the severe setbacks which all of the former minor mechanical department associations suffered during the depression years, normal activities of the four organizations mentioned above were resumed in 1937 under the guidance of the Committee on Coordination of Conventions, of which Frank Roesch, vice-president, Standard Stoker Company, was chairman. These first conventions, accompanied by an exhibit of the Allied Railway Supply Association, were highly successful and marked the beginning of an era of renewed life and usefulness for each of the associations. During this new era their work has been more closely coordinated with

F. L. Kartheiser, Sec.-Treas.

Car Department Officers' Assn.

J. S. Acworth, President

that of the Mechanical Division, A. A. R., and there is developing a growing feeling of mutual confidence and respect between the official association and the voluntary organizations of departmental officers and supervisors.

The Railway Fuel and Traveling Engineers' Association since the amalgamation of its former constituent organizations has become the liaison organization between operating and mechanical departments. Its programs deal with a wide range of problems having to do with the availability of motive power to the operating department and of the handling of trains and equipment on the road.

The Car Department Officers Association, which has developed from the old Chief Interchange Car Inspectors' and Car Foremen's Association, continues to deal with problems of interchange and inspection, but has broadened the scope of its program to include maintenance methods and standards as well as general problems of departmental management.

The Locomotive Maintenance Officers' Association is developing into an organization for the study and discussion of problems of backshop and engine-terminal management, and locomotive-maintenance standards and methods. It provides a forum for the consideration of the many matters of common interest to locomotive terminal and shop supervisors which do not come within the scope of any other organization.

The Master Boiler Makers' Association represents the supervisors of a single craft whose work so strongly affects the usefulness of the locomotive and is in turn so much affected by the conditions under which locomotives operate that it has long had a peculiarly useful place among associations dealing with mechanical-department matters—a place which has been less affected by change as time has passed than that of any of the former minor mechanical organizations.

During the years prior to the depression some overlapping and duplication of effort gradually developed in the programs of these associations. The holding of simultaneous meetings, opened with a joint session in which all participate, is already tending toward the development of a clearer understanding on the part of each of its peculiar function in serving the field covered by all. The continuance of this understanding and cooperation is the function of the Committee of the Coordinated Associations, organized following last Fall's conventions, the membership of which consists of the president and secretary of each of the associations.

T. Duff Smith, Sec.-Treas.

Railway Fuel and Traveling Engineers' Assn.

G. M. Boh, President

F. B. Downey, President

Locomotive Maintenance Officers' Assn.

J. E. Goodwin, Second Vice-President and Sec.-Treas.

Programs of Coordinated Associations

Meeting at Hotel Sherman, Chicago, October 22-25

Joint Session, Tuesday, October 22

Address by Col. Robert S. Henry, assistant to president, Association of American Railroads

Railway Fuel and Traveling Engineers' Association*

TUESDAY, OCTOBER 22

Morning

President's address.
Appointment of special committees.
Proportions of Steam Generated on Locomotive Boilers Used for Various Purposes, by E. E. Chapman, mechanical assistant, A. T. & S. F.

Afternoon

Locomotive Firing Practice — Oil, by Roy W. Hunt, fuel supervisor, A. T. & S. F.
Locomotive Firing Practice — Coal, by W. C. Shove, general road foreman of engines, N. Y., N. H. & H.

WEDNESDAY, OCTOBER 23—MECHANICAL DAY

Morning

New Locomotive Economy Devices, by A. G. Hoppe, assistant mechanical engineer, C., M., St. P. & P.
Address by D. S. Ellis, chief mechanical officer, C. & O.
Utilization of motive power, by A. A. Raymond, superintendent fuel and locomotive performance, N. Y. C.
Turbine and Condensing Locomotives, by L. P. Michael, chief mechanical engineer, C. & N. W.

Afternoon

Report on New York Central Tests at Selkirk, by W. E. Collins, engineer of tests, N. Y. C.

THURSDAY, OCTOBER 24—AIR-BRAKE DAY

Morning

Air Brakes, by J. A. Burke, supervisor air brakes, A. T. & S. F.
(a) No. 8 ET vs. No. 6 ET, by G. H. Higley, general air-brake inspector, Erie.
(b) High-speed Braking with D. 22 Control, by H. I. Tramblie, supervisor of air brakes, C. B. & Q.

Afternoon

Address on The Road Foreman and the Diesel Locomotive, by L. W. Powell, road foreman of engines, A. T. & S. F.

Evening (Movie Night)

Champion Coal.
Acetylene Association film.
Action of draft on Fuel Bed at Various Rates of Firing.

FRIDAY, OCTOBER 25—FUEL DAY

Morning

Coal Preparation, by S. A. Dickson, fuel supervisor, Alton.
Fuel Economy from the Viewpoint of the Chief Dispatcher, by T. O. Weeks, division trainmaster, M. P.
Fuel Records and Statistics, by E. E. Ramey, fuel engineer, B. & O.
Stationary Boiler Plants—Coal Fired, by E. G. Sanders, fuel conservation engineer, A. T. & S. F.
Who Uses and Wastes the Most Fuel, by J. G. Crawford, fuel engineer, C. B. & Q.
Elections.
Secretary-Treasurer's report.
Special Committee Reports—Subjects.

* Revised program.

Car Department Officers' Association

TUESDAY, OCTOBER 22

Morning

Approval of minutes of last annual meeting.
President's address.

Afternoon

Reports of Membership Committees:
Northeast district — A. J. Krueger, general chairman.
Southeast district—E. S. Smith, general chairman.
Southwest district — F. E. Cheshire, general chairman.
Northwest district — G. R. Andersen, general chairman.
Report of Secretary-Treasurer.
Report of unfinished business.
Report of new business.

WEDNESDAY, OCTOBER 23

Morning

Report of Publicity Committee—E. L. Woodward, western editor, Railway Mechanical Engineer, chairman.
Address: Importance of the car department in the function of rail transportation, by J. M. Symes, general manager, Western Lines, Pennsylvania, and second vice-president, Indianapolis Union Ry.
Report of Freight and Passenger Car Construction and Maintenance Committee—D. J. Sheehan, superintendent motive power, C. & E. I., chairman.
Report of Shop Operation, Facilities and Tools Committee — J. A. Deppe, superintendent car department, C. M. St. P. & P., chairman.

Afternoon

Report of Passenger Train Car Terminal Handling Committee—E. J. Hollahan, general car foreman, Illinois Central, chairman.
Report of Lubricants and Lubrication Committee—J. R. Brooks, supervisor lubrication and supplies, C. & O., chairman.

THURSDAY, OCTOBER 24

Morning

Report of Freight Car Inspection and Preparation for Commodity Loading Committee — F. J. Swanson, general car department supervisor, C. M. St. P. & P., chairman.
Address: Car maintenance, performance and expense, by O. A. Garber, chief mechanical officer, Missouri Pacific Lines.
Report of Interchange and Billing for Car Repairs Committee—M. E. Fitzgerald, master car builder, Chicago & Eastern Illinois, chairman.

Afternoon

Report of A. A. R. Loading Rules Committee —H. H. Golden, supervisor of A. A. R. interchange and accounting, L. & N., chairman.

FRIDAY, OCTOBER 25

Morning

Report of Painting Committee — C. L. Swing, general foreman, Pullman-Standard Car Mfg. Co., chairman.
Report of Booster Committee—Brad S. Johnson, sales engineer, W. H. Miner, Inc., chairman.
Report of Reception Committee — W. J. Demmert, sales agent, Griffin Wheel Co., chairman.
Suggestions for good of the association.

Afternoon

Report of the Nominating Committee — J. E. Keegan, chief car inspector, Pennsylvania, chairman.
Election of officers.

Master Boiler Makers' Association

TUESDAY, OCTOBER 22

Morning

President's address.
Remarks by L. B. Rhodes, president, Allied Railway Supply Association.

Afternoon

History of the Association by John A. Doarnberger.
Address by Dr. Edward C. Elliott, president, Purdue University.
Topic No. 2. Pitting and corrosion on firebox sheets and rivet heads.
Discussion of topics for 1941 meeting.

WEDNESDAY, OCTOBER 23

Morning

Business session.
Address by M. A. Quinn, general master mechanic, D. L. & W.
Topic No. 5. Application of iron, steel and alloy rivets with recommendations for heating and driving.
Illustrated paper by Ray McBrain, engineer of tests, D. & R. G. W., on Service aging of firebox materials.

Afternoon

Topic No. 3. (Continued from 1939)—Improving circulation in the locomotive boiler — Increasing feedwater temperature — Detrimental effects on circulation due to improper firing practices—Proper firing up and cooling down of boilers—Design of new boilers to improve their water-carrying properties.
Secretary-Treasurer's report.
Committee on Law.

THURSDAY, OCTOBER 24

Morning

Topic No. 1. Use of acetylene and electric processes in the boiler shop.
Paper with illustration by a committee of the International Acetylene Association, on Use of oxy-acetylene cutting and welding in the boiler shop.
Paper with illustrations by W. G. Theisinger, welding and metallurgical engineer, Lukens Steel Co., on Heat and mechanical stresses in welding and the forming and rolling of heads and plates.

Afternoon

Topic No. 6. (Continued from 1939.) Longitudinal cracking of flues in service.
Topic No. 8. Tender-cistern maintenance practices.

FRIDAY, OCTOBER 25

Morning

Topic No. 4. (Continued from 1939.) Chemical treatment of boiler feedwater.
Topic No. 7. Causes and control of cinder cutting.

Afternoon

Report of the Committee on Resolutions.
Report of the Committee on Memorials.
Report of the Executive Board.
Election of officers.

Locomotive Maintenance Officers' Association

TUESDAY, OCTOBER 22

Morning

President's opening address and report.
Secretary-Treasurer's report.
Introduction of members present.
Appointment of Nominating Committee.

Afternoon

What Members of the L. M. O. A. Can Do to Improve the Service on All Railroads — Address by C. B. Hitch, superintendent of motive power, C. & O.

WEDNESDAY, OCTOBER 23

Morning

The Design, Operation and Maintenance of Diesel Electric Locomotives, by H. V. Gill, supervisor of Diesel engines, Santa Fe System.
Future Locomotive Air Brake Maintenance, by J. P. Stewart, general supervisor of air brakes, Missouri Pacific Lines.

Afternoon

Use of Modern Machinery and Tools in Locomotive Repairs—Address by D. J. Sheehan, superintendent motive power, C. & E. I.

THURSDAY, OCTOBER 24

Morning

Roundhouse Problems of the Present Day—Address by H. E. Hinds, assistant mechanical engineer, C. B. & Q.
Election of Officers.

Afternoon

Luncheon in honor of Advisory Board.
Speaker: John M. Hall, director of Bureau of Locomotive Inspection, Interstate Commerce Commission, Washington, D. C. Subjects: The Responsibility of the Locomotive Maintenance Officer and the Federal Inspector.
Remarks by Advisory Board Members:
O. A. Garber, chief mechanical officer, Missouri Pacific.
D. S. Ellis, chief mechanical officer, C. & O.
J. Roberts, chief of motive power and car equipment, Canadian National.

FRIDAY, OCTOBER 25

Morning

Maintenance of Locomotives on Long Runs, by Lee Robinson, superintendent of equipment, Illinois Central System.

Afternoon

Secretary-Treasurer's report of convention.
Installation of new president and officers.
Outline for 1941.

Over 100 companies represented in

Allied Railway Supply Exhibit

L. B. Rhodes, President

Nearly 10,000 sq. ft. of space assigned in second exhibit held in connection with coordinated railway association meetings. More applications pending

J. E. Gettrust, Secretary

THE second large exhibit of the Allied Railway Supply Association at the conventions of the Railway Fuel and Traveling Engineers' Association, the Car Department Officers Association, the Master Boiler Makers' Association, and the Locomotive Maintenance Officers' Association will be held at the Hotel Sherman, Chicago, October 22 to 25, inclusive. The first exhibit of this organization of railway supply companies was held at the same place during the first simultaneous meetings of the co-ordinated associations in the fall of 1937.

The exhibit will occupy a floor space of about 38,500 sq. ft. on the mezzanine floor and in the adjoining main exhibit hall. Of this total floor space about 11,600 sq. ft. are available for actual booth spaces, of which there are 315 6-ft. by 5-ft. units and nine larger spaces of varying shapes and sizes. As this issue goes to press space has been assigned to more than 100 exhibitors. There are a number of other applications under negotiation.

The Allied Railway Supply Association

The Allied Railway Supply Association was organized in 1931. Because of the depression which halted the activities of the various railway associations with which it and its predecessors were associated, however, its first exhibit was not held until the resumption of full activity by the four co-ordinated associations with the meetings in 1937.

The officers who have been conducting the affairs of the association since the last convention and who are responsible for organizing the present exhibit are as follows: President, Lewis B. Rhodes, Vapor Car Heating Company, Washington, D. C.; first vice-president, J. W. Fogg, vice-president and general sales manager MacLean-Fogg Lock Nut Co., Chicago; second vice-president, C. F. Weil, American Brake Shoe & Foundry Co., Chicago; third vice-president, and treasurer, F. W. Venton, manager, railroad sales department, Crane Co., Chicago; fourth vice-president M. K. Tate, Lima Locomotive Works, Lima, Ohio; fifth vice-president H. S. Mann, Standard Stoker Co., Chicago; sixth vice-president, R. T. Peabody, Air Reduction Sales Co., New York; secretary J. F. Gettrust, The Ashton Valve Co., Chicago.

The Committee Chairmen

The work incidental to the organization of the exhibit, entertainment and assistance to the railway organizations in facilitating the conduct of their meetings has been assigned to six committees. These committees are in charge of the following chairman:

EXHIBIT

John W. Baker, vice-president, Locomotive Firebox Co., Chicago.

REGISTRATION

M. K. Tate, Lima Locomotive Works, Lima, Ohio.

ENTERTAINMENT

J. W. Fogg, vice-president and general sales manager, MacLean-Fogg Lock Nut Co., Chicago.

PROGRAM

F. C. Hasse, general manager, Oxweld Railroad Service Co., Chicago.

PUBLICITY

Roy V. Wright, editor, *Railway Mechanical Engineer*, New York.

The entertainment of the ladies will be in charge of a committee of which Mrs. Lewis B. Rhodes is chairman.

The Exhibit

The list of exhibitors, the products which they will show, and the names of the representatives in attendance, follow:

Air Reduction Sales Company, Chicago and New York.—Airco oxygen and acetylene; National carbide; Airco welding and cutting apparatus and supplies; electrodes; Wilson arc-welding machines. Represented by C. B. Armstrong, J. W. Benefic, M. M. Weist, and J. F. Franzen. Space 218.

Airetool Manufacturing Co., The, Springfield, Ohio.—Tube cleaners for boiler tubes, arch tubes, branch-pipe and circulating tubes. Represented by G. F. Ilgen and Leo C. Fintel. Space 172.

Ajax Hand Brake Co., Chicago and New York.—Ajax hand brakes for all classes of railway freight equipment. Represented by R. W. Burnett, J. H. Shaffer, C. R. Moline, and S. R. Polasek. Spaces 27, 28, and 29.

American Arch Company, Inc., New York and Chicago.—Security circulator; Security brick arch. Represented by B. A. Clements, Geo. A. Price, J. D. Brandon, John P. Neff, Thos. Mahar, A. H. Willett, M. S. Boyle, G. M. Bean, A. F. Becker, L. A. Clugh, E. H. Doerr, T. M. Ferguson, Wm. Haag, Thos. F. Kilcoyne, E. T. Mulcahy, W. E. Salisbury, and A. M. Sucese. Spaces 91, 92, 93, 102, 103, and 104.

American Locomotive Company, New York.—Lateral-cushioning device; lightweight alloy-steel rods; Universal spring plates; journal-box lid. Represented by F. S. Allen, E. J. Brown, W. A. Callison, W. S. Morris, N. C. Naylor and C. S. Venrick. Spaces 183, 184, 185 and 186.

Apex Tool & Cutter Co., Inc., The, Shelton, Conn. — Inserted drop-forged tools and holders for railroad metal-cutting operations; inserted-tooth milling cutters; Carboloy-tipped tools for use in holders. Represented by F. J. Wilson, Trent Mays, and L. F. King. Spaces 174 and 175.

Arrow Tools, Inc., Chicago.—Space 201.

Ashton Valve Co., The, Cambridge, Boston, Mass.—Locomotive safety valves; double- and single-dial locomotive steam and pilot gages; duplex back-pressure gages; feedwater heater; booster; illuminated quadruplex and single air gages; wheel-press recording gages and attachments for double wheel mounting; locomotive driving-wheel quartering gages; weight gage testers, etc. Represented by J. F. Gettrust, J. W. Motherwell, Charles Gaston, John Welsh, and E. C. Kenyon. Spaces 235 and 236.

Barco Manufacturing Company, Chicago.—Barco new double whistle low-water alarm; Barco Type M power reverse gear; new improved M-3 reverse gear valve; new improved 3VX steam, air, oil and water connections between locomotive and tender; 2-in. and 2½-in. car steam-heat connections. Represented by F. N. Bard, C. L. Mellor, W. J. Behlke, C. O. Jenista, F. B. Nugent, J. L. McLean, W. T. Jones, C. C. Cox, and L. J. Lytle. Spaces 74, 75, 120, and 121.

Barrett-Christie Co., Chicago.—Coffing hoists; Wells band-saw machines Oster pipe-threading machines. Represented by Harry Barrett, J. G. Christie, R. P. Kemp, R. D. Christie, J. E. Banks, H. N. Hayes, R. S. Acord, Orin Ash and C. E. Millard. Spaces 255, 256, 281, 282, 283, and 284.

Beaver Pipe Tools, Inc., Warren, Ohio. — Pipe- and bolt-cutting and threading tools and machines. Represented by Avery Phillis, and E. R. Barkley. Spaces 243, 244, and 245.

Berkley Machine Works & Foundry Co., Inc., Berkley, Norfolk, Va.—Berkley stoker. Represented by Samuel G. Jones. Spaces 50-53, inclusive.

Boss Bolt & Nut Co., Chicago.—Space 280.

Buckeye Steel Castings Company, The, Columbus, Ohio. — Six-wheel truck model; retractable coupler model; Type E coupler model; model of draft-gear assembly; four-wheel spring plankless truck model, and enlarged photographs of "all service" and eight-wheel trucks. Represented by F. J. Cooledge, Geo. A. Sutherland, M. R. Hansen, and R. H. Gaver. Spaces 214 and 215.

Chicago Pneumatic Tool Company, Chicago.—CP speed recorder; pneumatic and electric tools; air compressors. Represented by H. R. Deubel, C. L. Butler, W. Pallowick, and E. S. Rosselle. Space 189.

Cleveland Steel Tool Co., The, Cleveland, Ohio.—Punches; dies; rivet sets; chisel blanks. Represented by R. J. Venning, H. W. Leighton, and H. A. Lacerda. Space 173.

Collins & Aikman Corp., New York.—Transportation angora velvet upholstery fabrics. Represented by E. A. Smith and E. O. Fricker. Spaces 237, 238, and 239.

Corley Company, The, Jersey City, N. J. — Corley OK-TAG-ON-AL unions and fittings. Represented by Ralph A. Corley and George W. Bender. Spaces 16 and 17.

Crane Co., Chicago.—Full Crane line of A. A. R. valves and fittings, featuring carbon-molybdenum cast-steel O. S. & Y. globe and angle valve for 600 lb., 750 deg. F. Represented by F. W. Venton, G. G. Lindholm, and K. E. Watson. Spaces 285, 286, and 287.

Dampney Company of America, The, Hyde Park, Boston, Mass.—Automatic Apexior coating machine for locomotive boiler flues, also Apexiorized flues after service in boiler equipment, etc. Represented by C. J. Hunter and J. D. Bird. Spaces 163 and 164.

Dearborn Chemical Co., Chicago.—Boiler feedwater treatment; automatic wayside water treatment proportioning equipment; automatic blow-off and Foam level indicating equipment; apparatus for field tests of water samples; No-Ox-Id rust preventives. Represented by George R. Carr, R. A. Carr, R. O. Milnes, S. C. Johnson, L. O. Gunderson, F. B. Horstmann, W. H. Hinsch, C. C. Rausch, A. H. Reynolds, J. W. Nelson, O. W. Carrick, F. J. Boatright, L. D. Brown, R. A. Dalton, E. R. Glover, E. A. Goodnow, Fred Hooker, J. F. Johnson, T. F. Klein, R. J. Maginn, A. M. Novak, L. K. Ross, and B. H. Stone. Space C.

Detroit Lubricator Co., Detroit, Mich.—Locomotive, mechanical and hydrostatic lubricators; flange oilers; accessories for complete mechanical chassis lubrication. Represented by C. E. Sperry and E. F. Milbank. Spaces 222 and 223.

Duff-Norton Manufacturing Company, The, Pittsburgh, Pa. — Lifting jacks; power jacks; journal jacks; automatic lowering jacks; governor controlled self-lowering jacks; ball-bearing jacks. Represented by Robert G. Allen, W. I. Floyd, Earl E. Thulin, David F. Evans, Albert Roberts, George L. Mayer, James Gilchrist, Jr., and C. N. Thulin. Space F.

Durametallic Corporation, Kalamazoo, Mich., and Newark, N. J.—Packings for air pumps, cab cocks, reverse gears, booster engines, expansion joints, stoker engines, gage glass, feedwater heater pumps, valve rods, throttles and steam-admission pipes. Represented by Roscoe R. Smith, Herbert Lewis, J. J. McQuillen, Ralph Morgan, Frank Rollo, George W. Shriver, and M. Dale Ogden. Spaces 165 and 166.

Du-Wel Steel Products Co., Chicago.—Coupler centering device; roller side bearing; pipe clamps; A. B. branch-pipe Tee support. Represented by J. V. Wescott, C. M. Baker, R. M. Mulvey, and D. D. Wescott. Space 224.

Edna Brass Manufacturing Company, The, Cincinnati, Ohio.—Edna single lever injector; Fig. 339 Positive oil dividers; Positive drain reflex water gage; Model A mechanical force feed lubricator with regrindable unit 30 line checks; Type TA high-pressure terminal valve; Nelson automatic steam gage valve; Ednaloy engineered metals. Represented by John T. Ash, William Beck, B. I. Kaufmann, E. F. O'Connor and John F. Deems. Spaces 138, 139, and 140.

Ewald Iron Co., Louisville, Ky.—Space 229.

Flannery Bolt Co., Bridgeville, Pa. — Spaces, 80, 81, 82, 113, 114, and 115.

Franklin Railway Supply Company, Inc., New York and Chicago—Compensator and snubber; driving-box lubricator and spreader; flexible connections; fire doors; power reverse gears, etc. Represented by H. F. Ball, W. H. Coyle, H. M. Evans, C. W. F. Coffin, J. E. Long, W. T. Lane, D. I. Packard, G. W. Alcock, and T. C. Gray. Spaces 83 to 88 and 107 to 111.

Gilg, Henry F., Pittsburgh (12). — Specimens of Dunkirk solid and rolled-hollow staybolt steel; Gilg valve. Represented by J. C. Campbell and J. S. Lemley. Space 213.

Globe Steel Tubes Co., Milwaukee, Wis. — Spaces 158 and 159.

Graham-White Sander Corporation, Roanoke, Va.—Graham-White sanders, sand spreaders, and car-spring snubbers. Represented by Virgil L. Frantz, Frank H. Cunningham, and John S. Lemley. Spaces 42, 43, 60, and 61.

Griffin Wheel Company, Chicago. — Railroad chilled car wheels. Represented by W. J. Demmert, J. M. Welles, J. P. Maher, W. J. Fitzsimmons, and E. W. McDonald. Spaces 225 and 226.

Grip Nut Company, Chicago.—Reception booth. Represented by John H. Sharp, L. W. Kass, and E. H. Weigman. Spaces 205, 206, and 207.

Hanna Stoker Co., Cincinnati, Ohio.—Spaces 36, 37, 66, and 67.

Holland Company, Chicago.—Friction volute snubber springs; CAP-KO refrigerator car hatch closure; CAP-KO refrigerator-car-door fixtures. Represented by Cyrus J. Holland, Cyrus E. Holland, and Cal. W. Wulff. Space 1.

Hulson Grate Company, Keokuk, Iowa.—Hulson Tuyere type locomotive grate. Represented by J. W. Hulson and H. N. Gardner. Spaces 197, 198, and 199.

Hunt-Spiller Manufacturing Corporation, South Boston, Mass.—Hunt-Spiller lightweight valve; duplex sectional cylinder and valve-packing rings; Z-type pistons; crosshead shoes; Diesel liners, etc. Represented by V. W. Ellet, F. W. Lampton, D. F. Hall, E. J. Fuller, C. L. Galloway, and K. A. Craig. Spaces 141 and 142.

Huron Manufacturing Company, Detroit, Mich.—Washout plugs and bushings; arch-tube plugs and bushings; Huron Venetian spark arresters; Kales pressure-welded running boards and brake steps; direct-steaming connections; Ace self-feeding grease cups. Represented by Paul C. Cady, Louis E. Hassman, Robert J. Sherlock, Austin C. Ruse, Thomas R. King, and Trent Mays. Spaces 18 and 19.

International Correspondence Schools, Scranton, Pa. — Represented by C. G. Ash, A. C. Drynan, J. T. Gill, David Groves, Wm. E. Lamb, Ivan F. Stephens, and A. A. Welton. Spaces 220 and 221.

Irving Subway Grating Co., Inc., Long Island City, N. Y.—Model of Safkar steps; running boards for freight cars. Represented by H. W. Stahl and C. H. Lewis. Space 241.

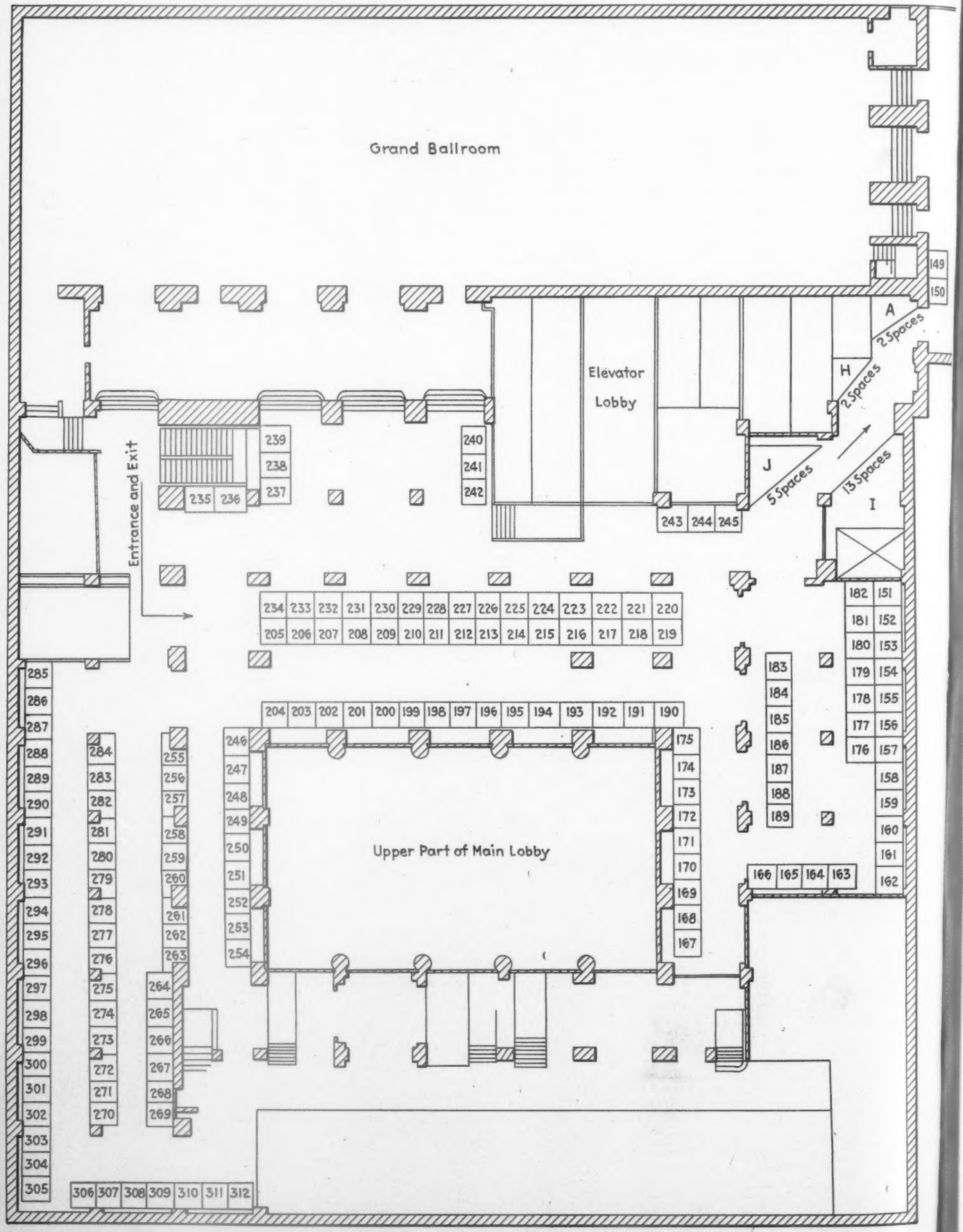
Johns-Manville, New York.—Locomotive and power-plant packing; locomotive, passenger-car and refrigerator-car insulations. Represented by P. R. Austin, C. E. Bryant, C. S. Clingman, Elliot Fairback, S. H. Flannagan, R. J. Offutt, T. O'Leary, Jr., C. M. Patten, H. R. Poulson, W. W. Prosser, G. R. Tierney, R. P. Townsend, John H. Trent, F. C. Vandervort, and L. T. Youhn. Spaces 288 to 291, inclusive.

Joyce-Cridland Company, The, Dayton, Ohio.—Complete line of railroad jacks, including air-motor hoists, journal jacks, track jacks, automatic lowering jacks, geared ratchet lever jacks, self-lowering jacks, etc. Represented by Huston Brown, Merle P. Smith, D. H. McAdams, Adrian Walker, R. C. McDonald, and W. F. Weber. Spaces 22 and 23.

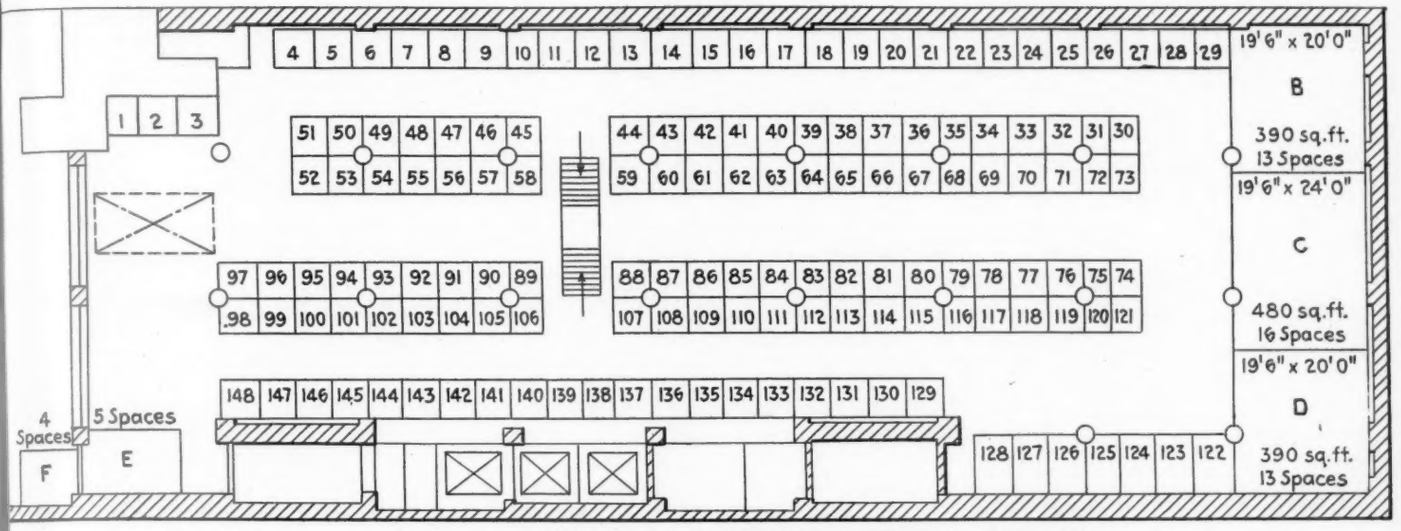
Lehon Company, The, Chicago.—Small samples of various mechanical-department specialties. Represented by J. W. Shoop, H. A. Wolfe, J. E. Eipper, R. J. Mulroney, and A. C. Senseney. Space 200.

Lewis Bolt & Nut Company, Minneapolis, Minn.—Sealtite car bolts; Macer journal-bearing protectors; Sealtite Staybolt hole bushings. Represented by H. W. Johnson and R. B. Hill. Space 246.

Lima Locomotive Works, Incorporated, Lima, Ohio.—Reception booth. Represented by A. J. Townsend and M. K. Tate. Space No. 105.



Arrangement of exhibit spaces at the Hotel Sherman—Mezzanine floor



Arrangement of Exhibit spaces at the Hotel Sherman—The main exhibition hall

Locomotive Finished Material Co., Atchison, Kan.—Martin locomotive stoker and power engine; one-piece Z-type lightweight piston and lipped type combination universal sectional bull and packing rings; model of the Universal design main driving-wheel center; model of one-piece cast-steel cylinder. Represented by R. L. McIntosh, A. H. Moorhead, Wm. Purcell, G. W. Taylor, and Wm. O. Martin. Spaces 294, 295, 296, 297, and 298.

Locomotive Firebox Company, Chicago.—Nicholson Thermic syphons; Cyclone front ends; Christy pneumatic lubricators, and syphon sanders. Represented by W. S. Carr, L. R. Pyle, John Baker, C. M. Rogers, B. E. Larson, M. A. Foss, K. L. Boyette, E. J. Reardon, E. Frank Smith, and Fred Bramley. Space B.

Lunkenheimer Co., The, Cincinnati, Ohio.—A. A. R. valves; valves for blower service; feedwater heater and stoker throttles; lubricators, and other engineering appliances. Sectioned samples. Represented by W. George Cook, Karl B. Litzelmann, and I. A. Orth. Spaces 122 and 123.

MacLean-Fogg Lock Nut Company, Chicago.—Lock nuts; nut locks; floor clips; dust guards; defect-card receptacles. Represented by J. W. Fogg, J. A. MacLean, Jr., A. W. MacLean, H. J. Cearity, L. A. Rowe, E. G. Doke, and H. J. Voss. Spaces 116, 117, and 118.

Mall Tool Company, Chicago.—Portable electric saws; portable electric drills; portable flexible shaft machines for shop use. Represented by F. A. McGonigle, M. Rehnquist, A. W. Hall, M. L. Riley, and D. Soderberg. Spaces 227 and 228.

Midland Company, The, South Milwaukee, Wis.—Midland sealed door safety fixtures; combination safety stop and door hanger; door hangers; door fixtures for baggage, express and mail cars. Represented by Clair P. Nourse, Howard P. Cook, Robert Nourse, and Frank G. Schwartz. Space 20.

Miner, W. H., Inc., Chicago.—Small models of friction draft gears, truck-spring snubbers, hand brakes, etc. Represented by H. S. Brooks, Bradley S. Johnson, L. A. Marquardt, A. R. Nelson, R. J. Olander, A. G. Peterson, W. G. Roth, W. J. Trongeau, and R. H. Weber. Space 230.

Monarch Packing & Supply Company, Chicago.—Packings. Represented by W. P. Lyons, C. C. Humberstone, Stanley MacDole, and Wm. J. Forbes. Space 44.

Morton Manufacturing Company, Chicago.—Morton Open-Grip freight-car safety metal running boards and brake steps. Represented by Charles D. Morton, John D. Cannon, James A. King, Walter A. Klopsch, Carl H. Kadie, Chester T. Stansfield, George H. Goodell, and James B. Peddle. Spaces 129 and 130.

Murdock Mfg. & Supply Co., The, Cincinnati, Ohio.—Murdock water service boxes; outdoor anti-freezing hydrants; drinking fountains and street washers; Murdock QOC air valves, and Murdock EP air check valves. Represented by Thomas E. Bart. Spaces 209 and 210.

Nathan Manufacturing Company, New York.—Mechanical lubricators; oil distributors; atomizers; injectors and starting valves; boiler drop plugs; water column and water gage; boiler check valves. Represented by Fred Ehredt, J. F. Farrell, B. Folke, R. H. Jenkins, J. A. Kelly, J. D. Spaulding, and Richard Welsh. Spaces 40, 41, 62 and 63.

National Aluminate Corporation, Chicago.—Nalco Waterlab; Unit type water-treating plant; automatic continuous blowdown system; slides showing story of water treatment. Represented by W. R. Anthony, C. M. Bardwell, B. D. Barger, C. A. Brown, J. L. Callahan, P. W. Evans, C. B. Flint, J. L. Gibboney, R. J. Hill, R. V. Lucas, H. A. Marshall, V. E. McCoy, E. M. Miller, H. H. Richardson, H. D. Shaw, and T. G. Windes. Spaces 151 to 157 and 176 to 182, inclusive.

National Malleable and Steel Castings Company, Cleveland, Ohio.—Full-size draft gears; models of couplers, yokes, journal box and truck. Represented by T. W. Aishton, J. F. Hutson, F. E. Moffett, and E. A. Powell. Spaces 211 and 212.

Oakite Products, Inc., New York.—Tank-car cleaning unit, Model 324, for cleaning tank-car interiors; Oakite solution-lifting steam gun, Model 385, for steam cleaning operations; solution-lifting air gun, Model 391, for cleaning certain types of air-conditioning equipment on railroad coaches, etc.; various new Oakite materials for special railway maintenance cleaning work. Represented by B. C. Browning, J. C. Leonard, L. B. Johnson, and H. L. Gray. Space H.

Ohio Injector Co. of Illinois, The, Chicago.—Reception booth. Represented by Frank Wm. Edwards, W. H. Malone, and Howard F. Meyers. Spaces 187 and 188.

Okadee Company, The, Chicago. — Blow-off valves; safety water-glass protectors; air-operated cylinder cocks; blow-off separators; steam-operated cylinder cocks; blow-off mufflers; tender hose couplers; drain valves. Represented by D. P. Morgan, J. F. Raps, C. G. Learned, C. W. Ploen, G. E. Johnson, I. W. Hebner, and B. B. Rich. Spaces 116, 117, 118, and 119.

O'Malley, Edward, Valve Co., Chicago.—No. 660 Dual stoker-operating valve; No. 770 Dual stoker-operating valve A. A. R.; No. 643 quick-opening blower valve, 1 in. and 1¼ in.; gage cocks; water-glass valves and other valves; Master valve repair set. Represented by S. C. Boston, Edward O'Malley, Sr., and Edward O'Malley, Jr. Spaces 46, 47, 56, and 57.

Oxweld Railroad Service Company, The, (unit of Union Carbide and Carbon Corporation), New York.—Machine-cutting, hand-cutting and welding blowpipes, including Oxweld C-12-R machine-cutting blowpipe, W-24-R welding blowpipe, and C-14-R cutting blowpipe with special nozzle for cutting scrap. Photo-enlargements showing shape cutting and the cutting of piled plates with the oxyacetylene cutting machine, the welding of locomotive piping, and bronze welding in repair work. Represented by L. Adams, M. C. Beymer, G. P. Bogert, M. Burnett, Jr., T. A. Cash, E. Cordeal, M. A. Deaton, R. J. Dodds, F. C. Hasse, G. Hauskins, W. A. Hogan, W. Jones, J. E. Kniple, O. F. Ladtkow, J. J. Langdon, W. Leighton, W. H. Matthes, J. W. O'Neill, J. W. Ritcey, J. H. Rodger, M. J. Rotroff, H. W. Schulze, and A. L. West. Spaces 76, 77, 78, 79, 116, 117, 118, and 119.

Paxton-Mitchell Co., Omaha, Neb.—Paxton-Mitchell metallic piston-rod and valve-stem packing; locomotive cab window; Leathem power reverse gear; special iron and locomotive castings. Represented by James L. Paxton, Jr., James L. Keliher, Howard W. Dillon, E. M. Hendrickson, and G. A. Blistain. Spaces 131, 132 and 133.

Penn Iron & Steel Company, Creighton, Pa.—Sample test specimens of staybolt iron. Represented by Chas. J. Nieman and John W. Davis. Space 45.

Pilliod Company, The, Swanton, Ohio, New York and Chicago.—New style reverse yoke and radius bar (for Baker valve gear) equipped with needle bearings and forged bell crank; framed photographs and locomotives recently equipped with Baker valve gear. Represented by Frank Fisher, L. R. Baker, F. E. Pilliod, and R. H. Weatherly. Spaces 216 and 217.

Pocket List of Railroad Officials, New York.—Publication. Represented by Harold A. Brown and B. J. Wilson. Space 204.

Portable Plating & Equipment Company, Chicago.—Jenkins leather fibre dust guards; Atlas safety and hydraulic jacks; Supersoly products; Firestone rubber tie plates. Represented by J. E. Buckingham, A. W. Donop, and S. A. Stephens. Spaces 14 and 15.

Prime Manufacturing Company, The Milwaukee, Wis.—Prime automatic cylinder protection valves; steam cylinder cocks and operating valves; cab panels, ventilators and windshield wings; cab curtains. Represented by H. B. Nelson, C. K. Ramp, J. A. Lucas, and D. A. Kelly. Spaces A, 149 and 150.

Pyle-National Company, The, Chicago. — Headlights; turbo-generators; back-up, marker and classification lights; floodlights; locomotive and car electrical fixtures and fittings; safety switches; portable hand lamps; vapor-tight fittings, plugs and receptacles for battery charging, air conditioning and general purpose. Represented by J. A. Amos, J. V. Baker, W. W. Booth, W. H. East, G. E. Haas, A. E. Johnson, W. A. Ross, and W. A. Wulle. Space D.

Q & C Co., The, New York.—Mechanical lubricator; roller truck side bearing; emergency coupler knuckle. Represented by Lewis Thomas, L. E. Hassman, and E. I. Hetsch. Space 242.

Railway Purchases and Stores, Chicago.—Copies of publication. Represented by Edward Wray, K. R. Sheeran, and J. P. Murphy, Jr. Space 219.

Reliance Machine & Stamping Works, New Orleans, La. — Spaces 292 and 293.

Ryerson, Joseph T., & Son, Inc., Chicago.—Lewis special staybolt iron. Represented by J. P. Moses, A. M. Mueller, G. L. Shinkle, W. R. Lockwood, and R. W. Burt. Space 58.

Sargent Company, Chicago.—Locomotive steam specialties: quick-acting blower valves; water columns; safety water-glass cocks; Sargent water-glass protectors; double-seat gage cock. Represented by Frederick W. Becker, Louis L. Schultz, and W. H. Heckman. Space 208.

Wm. Sellers & Company, Incorporated, Philadelphia, Pa. — Injectors, checks, steam lever valves, drifting valves, strainers, boiler washers and testers, locomotive and box-car washing apparatus. Represented by P. E. Raymond, James R. New, and I. P. Pedrick. Spaces 202 and 203.

Simmons-Boardman Publishing Corporation, New York.—Railway Mechanical Engineer and other transportation magazines and books. Represented by L. B. Sherman, R. E. Thayer, H. A. Morrison, F. H. Thompson, H. H. Melville, H. E. McCandless, S. W. Hickey, C. W. Merriken, Jr., R. V. Wright, C. B. Peck, E. L. Woodward, H. C. Wilcox, and C. L. Combes. Spaces 232, 233, and 234.

Sinkler, Joseph, Inc., Chicago.—J-S Style No. 66 semi-metallic locomotive packing; Milwaukee portable locomotive crank-pin grinder; Tom automatic drain valves; Thompson boiler plugs; Duro electrode holders. Represented by Joseph Sinkler and Helen Sinkler. Spaces 48, 49, 54 and 55.

Spring Packing Corporation, Chicago.—Space 247.

Standard Brake Shoe & Foundry Co., Pine Bluff, Ark., and Memphis, Tenn.—Duo-Cast metal for locomotive grates and Stanfast spring bands for locomotive springs. Represented by Earle A. Mann, Robert E. Mann, and Adrian A. Walker. Space 24.

Standard Car Sales, Inc., Chicago.—Champion hand brakes; Walton air filters. Represented by R. E. Frame, F. L. Barber, Franklin D. Barber, John B. Edgerton, E. E. Van Cleave, and John D. Ristine. Space 194.

Standard Car Truck Company, Chicago.—Barber stabilized trucks; lateral-motion device; side bearings. Represented by R. E. Frame, F. L. Barber, F. D. Barber, John B. Edgerton, and John D. Ristine. Spaces 192 and 193.

Standard Stoker Company, Inc., The, New York, Chicago, and Erie, Pa.—Mechanical locomotive stoker; model of Type DA coal pusher. Represented by E. A. Turner, F. P. Roesch, J. R. Sexton, C. T. Hansen, C. R. Davison, L. F. Sweeney, G. M. Myers, LeRoy Dysart, E. H. Parr, H. W. Cook, G. A. Edwards, H. N. Carmer, H. J. Atkinson, H. P. Farrington, and Bernard Peyton. Space E.

Superheater Company, The, New York.—Reception booth. Represented by H. C. Bell, L. H. Birkett, T. F. Birmingham, P. D. Blanchard, E. C. Bonistall, C. A. Brandt, H. E. Brown, Bard Browne, S. L. Brownlee, G. L. Dolan, E. J. Drewyour, C. R. Fairchild, Geo. Fogg, J. F. Griffin, H. G. Harrison, T. F. Jackson, H. M. Kirby, E. W. Kush, J. E. Mourne, C. A. Odell, R. M. Ostermann, F. A. Schaff, Ira F. Sharp, F. W. Smith, Chas. H. True, Sr., C. C. Turner, T. J. Vallance, L. R. Bryan, F. J. Dolan, S. Macdonald, B. G. Lynch, T. P. McGinnis, N. T. McKee, R. J. VanMeter, A. Williams, and C. H. David. Spaces 94-101.

Superior Hand Brake Co., Chicago.—Hand brakes and hand-brake chain adjuster. Represented by H. C. Smith and R. C. O'Connor. Spaces 190 and 191.

Superior Railway Products Corporation, Pittsburgh, Pa.—Superior automatic soot blowers for locomotives; pneumatic bell ringers; Auto-Tite flexible joints and metallic steam connectors; Rees jacks. Represented by W. O. Martin and W. E. Larson. Spaces 89 and 106.

Swanson Company, The, Chicago.—S-CO automatic flange oiler; Swanson gage holder. Represented by O. W. Swanson and R. V. Larson. Space 25.

T-Z Railway Equipment Co., Chicago.—General locomotive and car specialties: T-Z metallic packing, blow-off valves; washout plugs, cylinder cocks, tank valves, etc.; pipe clamps, running boards, brake steps, etc. Represented by G. S. Turner, F. J. Kearney, F. B. Platt, G. S. Turner, Jr., and W. H. White. Spaces 30, 31, 72, and 73.

Talmage Mfg. Company, The, Cleveland, Ohio.—Talmage safety water gages. Represented by Frank M. Roby. Space 26.

Timken Roller Bearing Company, The, Canton, Ohio.—Timken railway bearings for car trucks, locomotive driving axles, engine and trailer trucks, and tender trucks, completely mounted in journal boxes; Timken light-weight reciprocating parts for steam locomotives. Represented by W. C. Sanders, P. N. Wilson, C. F. Crowell, and R. J. Daniels. Spaces 4 to 13, inclusive.

Union Asbestos & Rubber Company, Chicago.—Asbestos products. Represented by J. H. Kuhns, O. J. Rudolph, J. B. Crawford, P. S. Nash, G. L. Green, and R. M. Covert. Spaces 195 and 196.

Union Railway Equipment Company, Chicago.—Ureco V-38 high-power vertical wheel hand brake; high-power drop-hand brake; all-metal floor rack for refrigerator cars. Represented by J. G. Forster, R. H. Buck, and E. W. Zane. Spaces 250 and 251.

Unit Truck Corporation, New York.—Unit truck; brake beams; wear plates; side frames. Represented by L. A. Crone, C. R. Busch, E. F. Gladwell. Spaces 1, 2, 3, X1, X2, and X3.

U. S. Metallic Packing Company, The, Philadelphia, Pa.—Metallic packing, lubricators and sanders. Represented by Harry E. Hyslop, Clyde Hyslop, Lewis B. Miller, and Robert E. Buckley. Space 90.

Valve Pilot Corporation, New York.—Loco Valve Pilot; Loco Recorder; automatic train signal forestalling recorder. Represented by William Bell Wait, John L. Davidson, R. S. Folk, C. D. Jones, W. K. Winkler, W. W. Bacon, H. H. Bollinger, C. F. Pennypacker, W. K. Carter, and F. D. Welden. Spaces 38, 39, 64, and 65.

Vapor Car Heating Co., Inc., Chicago.—Zone system vapor for passenger-car heating; thermostatic control of air conditioning; locomotive and car heating specialties; steam generators for Diesel locomotives; Represented by L. H. Gillick, W. H. Tucker, F. E. Hess, E. C. Post, F. B. Rutherford, E. E. Smith, E. A. Russell, J. VanVulpen, P. B. Parks, E. H. Burgess, R. Vlaming, and H. Owen. Spaces 143 to 148, inclusive.

Viloco Railway Equipment Co., Chicago. — Sanders; sander-operating valves; bell ringers and valves; pneumatic whistle operators; by-pass valves; automatic rail washers. Represented by D. P. Morgan, J. F. Raps, C. G. Learned, C. W. Ploen, G. E. Johnson, I. W. Hebner, and B. B. Rich. Spaces 76, 77, 78 and 79.

Westinghouse Air Brake Company, Wilmerding, Pa.—Decelostat for HSC brake equipment; 8½-in. cross-compound compressor with F-1 lubricator and air filter; after-cooler for locomotive air-compressor installation; improved hose couplings, nipples, and clamps; E-2 Pneuphonic horn; latest types of slack adjusters; four-position pressure retaining valve. Represented by S. G. Down, C. H. Beck, G. L. Cotter, C. C. Farmer, C. D. Stewart, J. B. Wright, A. K. Hohmyer, J. S. Y. Fralich, G. C. Farmer, P. H. Donovan, L. M. Carlton, J. R. Holtom, J. B. Ball, Lawrence Wilcox, E. A. Maylock, R. P. Ives, V. B. Emrick, A. G. Huston, F. B. Johnson, D. W. Lloyd, R. J. Knapp, D. R. Collins, C. J. Werlich, T. W. Baldwin, E. H. Weaver, and Thomas G. Myles. Spaces 124 to 128, inclusive.

Wilson Engineering Corporation, Chicago. — Reception booth. Represented by J. J. Clifford, J. M. Lammedee, and L. F. Wilson. Space 231.

Wine Railway Appliance Company, The, Toledo, Ohio.—Wine door locks; hopper frames; brake balancers; side bearings; Safe-Grip ladders and grab irons; gondola drop end locks. Represented by Cyrus Hankins, Cleon M. Hannaford, Geo. B. Christian, L. J. Tillman, and Earl H. Fisher. Space J.

Worthington Pump and Machinery Corporation, Harrison, N. J.—Steam valve gear; water valve service; spray valve nozzle; drifting control valve; steam control valve, charts, etc., all pertaining to locomotive feedwater heating equipment. Represented by W. R. Leopold, Fred B. Smith, V. W. Rafferty, Fred B. Griffith, Geo. Dill, E. C. Jackson, L. H. Bishop, Thos. Cruthers, Thos. C. McBride, J. J. Alves, Jr. Space 21.

Youngstown Steel Door Co. and Camel Sales Co., Chicago.—Reception booth. Represented by H. E. Creer, L. F. Duffy, A. G. Dohm, K. J. Tobin, G. R. Treptow, E. C. Browne, W. A. Beauchamp, and E. E. Robbins. Space 240.

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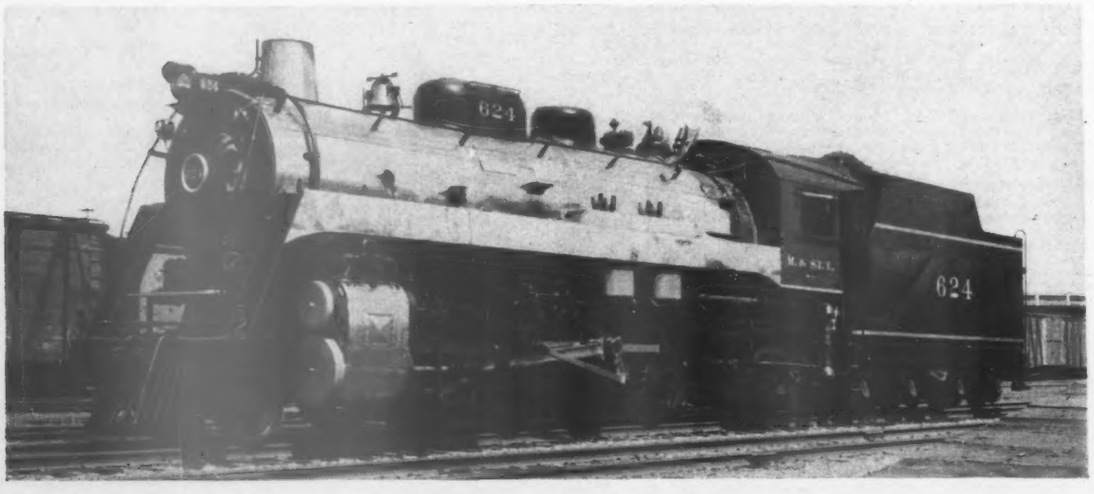


Minneapolis & St. Louis Locomotive No. 624 equipped with a boiler jacket of stainless steel—Photographed by M. C. Wallace, draftsman, M. & St. L., at Minneapolis, Minn.

EDITORIALS

S. 2009 Becomes a Law

On September 18 President Roosevelt signed S. 2009, the Wheeler-Lea omnibus transportation bill. It thereby becomes the Transportation Act of 1940. It is doubtful if any law passed by Congress has received so much study and discussion as has this act.

There are some things about its checkered career in the legislative mill that do not reflect credit upon the parties involved and possibly had better be buried and forgotten, that is, so far as public discussion is concerned. It is a step forward and that is about as much as can be said for it, so far as the railroads are concerned. It does place the regulation of the waterways under the Interstate Commerce Commission. It also provides, among other things, for the setting up of a three-member board to study the transportation problem. This in the long run may influence additional legislation which will tend to protect the railroads from the subsidized competition of other forms of common carriers and to relieve them of some of the unfair handicaps to which they are now subjected. Possibly it was expecting too much, with world affairs and national politics as they now are, to have a greater step taken in the right direction at this time.

Convention Attendance— Asset or Liability?

On October 22-25, inclusive, the four so-called coordinated associations will hold their annual conventions at the Hotel Sherman, Chicago. The value of a trip to the meeting of his association will be greatly enhanced for each supervisor this year by a large and varied exhibit of car and locomotive appliances, shop equipment, and maintenance materials. Indeed, for those who do not have to travel too far, a trip to Chicago during these meetings would be justified alone by the opportunity to study the displays of the more than 100 exhibiting concerns.

Personal Value to the Supervisor

But the exhibit is an incidental benefit and not the main reason why there should be a large attendance of officers and supervisors from the fields served by the four associations. Those men whose hope for the future lies in their understanding of and their ability to cope with the problems of utilization, operation, and maintenance of locomotives and rolling stock have a strong personal motive for seeing that they get to these meetings. Nowhere else can they so quickly have their preconceptions confirmed, modified, or knocked out of their heads as at a meeting which brings together the varying viewpoints and different backgrounds of experience of men all dealing with the same basic problems. Only after one's own ideas have been tested and modified by a thoughtful weighing of conflicting viewpoints does one arrive at the beginning of understanding. And if understanding is the beginning of wisdom certainly, to one who knows how to take advantage of his opportunities, convention attendance may be a very definite aid to the attainment of wisdom.

There are many who would place the attainment of wisdom above all other objectives, even above advancement by promotion. With it comes an appreciation of one's limitations as well as of one's capacities which one must have if he is to make the most of himself.

Another reason why the ambitious supervisor should get himself to his convention lies in the distinct opportunities which convention work offers for the development of such qualities of leadership as he may possess. At home the supervisor exercises authority in the performance of his duties. In convention work he is associated with his equals. What he is able to accomplish depends entirely on how effectively he can work with them and, on occasion, influence them to his own point of view. The ability thus developed over the years of convention work has broadened and advanced the careers of many men.

What Return Do the Railroads Receive?

But most of the men who attend these conventions are sent by their managements. At this point some readers are asking why the railroads should send their supervisors to conventions for the purpose of advancing their personal ambitions. Let us leave that question for the moment and consider convention attendance more strictly from the viewpoint of the management.

The educational value of convention attendance has been stressed whenever the subject has been under discussion in these columns. Men acquire a wider knowledge of accepted practices and learn the relationship between tools and methods in the reports presented at the conventions and in the discussions both on and off the floor. This is the most obvious function of association work.

Of equal value from the standpoint of the employer, though less tangible and, therefore, more difficult to appraise, is the inspiration which men get from convention attendance. When one returns from a convention at which he has listened to the best thought and

a compilation of the best practice for dealing with problems which are his own and—better yet—in the study of which he has contributed either on the program itself or by the expression of his own thought in the discussion, he approaches the every-day duties of his job with a renewed energy, a broadened outlook, and a stimulated mind. Though these qualities are intangible when one attempts to evaluate them in terms of dollars and cents, it is not difficult to see how they may return far more than the expense involved in sending men to conventions in the effectiveness with which men meet emergencies and, in the alertness with which they initiate new and more economical methods in their departments.

The Highest Return—The Development of Men

If there is a question in the minds of some of our readers why the railroads should send supervisors to conventions in order to advance their own personal ambitions, it may well be asked in reply what more effective means can the railroad employ to enhance its own return from the services of these men than by making them more valuable. The more valuable they are to themselves, certainly the more they are worth to the employer.

The greatest return to the railroads from the convention attendance of their men comes from the qualities of leadership, the widened outlook, and the surer judgment which men acquire through convention contacts.

Shop Employment and National Defense

As our program of national defense begins to take shape, it becomes more evident that one of the disturbing shortages which must be dealt with is a lack of sufficient men trained in the skilled trades. In an address before the National Convention of the American Legion on September 23, William S. Knudsen, chairman of the National Advisory Defense Commission, called particular attention to this shortage as a factor in holding back the nation in training a large modern army.

The mechanical departments of few railroads have ever completely recovered from the disrupting effects of the long depression. Employment of equipment-maintenance forces, particularly those in the back shops, is still intermittent in too many instances—long shut-downs may break the continuity of employment several times a year. With the improvement in traffic which has been shown so far during this year, the frequency and extent of such shut-downs has been considerably reduced. From now on, whenever shut-downs seem to be necessary, the railroads are facing a dilemma. The mechanical-department officer who assumes that he has any claims on men while they are laid off is likely to be rudely awakened when the next call for a return to work goes out. Industry is grabbing the cream of railway mechanics as opportunity offers.

This change in the demand for certain classes of labor is giving point to the serious need for the development of some plan for stabilization of employment in railroad shops. It is true that the railroads are without control of their volume of production. They are at the mercy of the fluctuations in commerce and in industrial production which they do not control. Since ton-miles must be consumed as produced, little can be done to stabilize employment in the train services. This does not hold true, however, for maintenance employees. It is possible for the management willing to tackle the problem with determination to smooth out the most of the month-to-month fluctuations in shop employment. Year-to-year adjustments will still be necessary, but with the elimination of the more frequent fluctuations most employees might again come to regard their jobs as possessing a reasonable degree of permanency. The alternative to some such solution is likely to be the loss of skilled labor to industries involved in our national defense program.

Related to the question of the conservation of present employees is the almost equally acute question of the training of men for manning the shops in the future. Railway employees are growing old. Even though the situation were not aggravated by losses to industry the need for the injection of young men into the organization is rapidly becoming acute. Every mechanical department at present without an adequate apprenticeship system which involves theoretical training and mental discipline as well as shop training, should be planning to install one without delay. The alternative may be a further encroachment of government subsidy —and control—to include the railroads in its schemes for recruiting industry.

Magnaflux Testing

The rapid extension of Magnaflux testing in railway locomotive and car shops throughout the country affords convincing evidence of the effectiveness of this method of locating defects such as progressive fractures, external grinding cracks, internal shrinkage cracks, slag pockets, etc., in steel parts before these defects have developed to such a point as to cause service failures with the attendant costly interruption of service, damage to equipment and possible loss of human life. The prevalence of modern high operating speeds creates an increasingly urgent demand for reliability in steel locomotive and car parts and it can hardly be questioned that, in the detection of potentially defective axles alone, this new method of testing has more than justified itself.

Magnaflux testing equipment and methods have been

described quite fully in previous issues of *Railway Mechanical Engineer* and yet it is obvious that neither the fundamental advantages nor limitations of this new method of testing are always clearly understood, judging by questions asked at a recent southern railway club meeting at which this subject was discussed. For example, the first question related to the direction of a crack which can be detected by the magnaflux method and the answer was that the transmission of an electric current of large amperage and low voltage through a cable, wound around the steel parts being tested, induces a strong magnetic field lengthwise of the part and any transverse crack interrupting the lines of flux will be indicated at the surface by the adhesion of dry Magnaflux powder to the crack when the part is vibrated. To locate a longitudinal crack in a part such as a car axle, the electric current is passed directly through the axle, itself, which serves as a conductor and gives a circular field of flux lines which would be crossed by any longitudinal discontinuity. Obviously, therefore, the Magnaflux machine provides inspection primarily in one direction at a time.

Another question relating to the possibility of discovering internal defects is answered by the fact that by far a great majority of all cracks in steel parts originate at the surface and hence give an indication when tested by the Magnaflux method. It is said to be a fact, however, that sizable internal fractures such as shrinkage cracks in steel castings can be detected if they extend within ¾ in. of the surface and the proper amperage of direct current is used. In response to a query, the statement was made that the Magnaflux powder used in this testing method is pure iron, the most highly permeable metal available, and hence the one which responds most freely to flux leakage.

In discussing the question of whether the introduction of the Magnaflux testing method does not tend to cause the scrapping of an undue number of locomotive and car parts due to the discovery of small defects, it was said that the conditions causing these defects may in most cases be corrected and many of the parts themselves returned to service by a little judicious reconditioning work. The experience was cited of one railroad which developed an alarming number of defects and replacements on the first shopping of locomotive parts after introduction of the Magnaflux method, these replacements on the second shopping being substantially reduced and on the third or fourth, the indicated defects reached a gratifyingly low point.

Obviously, under present conditions, the Magnaflux method can give no indication of a car axle crack, for example, entirely within the wheel fit and, in some instances, wheels have been pressed off about 1 in. so as to give an indication or check of this part of the wheel seat where fractures usually occur. If none is found the wheels are pressed back on again, due precautions being taken to assure that correct mounting pressures are maintained. Intensive research is being conducted in this and associated problems, as it is realized that there is great need for a testing method which will indicate defective parts in railway cars and locomotives without the delay and cost of shopping the equipment and removing the parts for separate, individual tests.

New Books

MACHINE SHOP TRAINING COURSE. *By Franklin D. Jones. Two Volumes, 6 in. by 9 in. Volume 1, 474 pages; Volume 2, 552 pages. Published by The Industrial Press, 148 Lafayette St., New York. Complete two-Volume course, $6; Volume 1 or Volume 2, $4, if purchased separately.*

The Machine Shop Training Course covers both elementary and advanced machine shop practice. Volumes 1 and 2 may be used independently, each covering about half of the subjects dealt with in the complete two-volume treatise.

The first volume begins with fundamental principles underlying all metal-cutting operations, and continues with various branches of lathe work. Then follows the general application of turret lathes and automatic machines; drilling, reaming, and boring, including precision jig boring; drill grinding; the use of tolerances and allowances in interchangeable manufacture; and, finally, the various types of measuring and gaging tools, with typical applications.

The second volume deals with such subjects as tapping, thread cutting with dies, thread milling, thread grinding, and thread rolling; planing practice; milling, including the milling of irregular contours by reproducing the shape of a model; different systems of indexing; gear-cutting on milling machines; gear-cutting by generating methods, featuring the basic principles; external and internal grinding; lapping, broaching, chipping, filing, and scraping; tool steels and other metal-cutting materials; and the heat-treatment of tool steels.

Questions have been used throughout the work instead of ordinary sub-heads because of their interest-stimulating value. These questions are followed by complete answers averaging about one page in length. Definitions of 330 shop terms in general use occupy 48 pages at the end of Volume 2.

The Machine Shop Training Course not only explains how, but gives the reasons why. For example, the four sections or chapters on the use of measuring instruments and gages are preceded by two sections explaining why the degree of accuracy is controlled in interchangeable manufacture, and why different classes of fits are employed and have, to some extent, been standardized. This general method of treatment is followed throughout.

The treatise not only deals with all standard types of machine tools and illustrates their use by typical applications, but it includes numerous shop problems with complete solutions.

The information on the details of machine shop practice is supplemented wherever necessary, with explanations of whatever mechanical principles may be directly allied to the subject.

With the Car Foremen and Inspectors

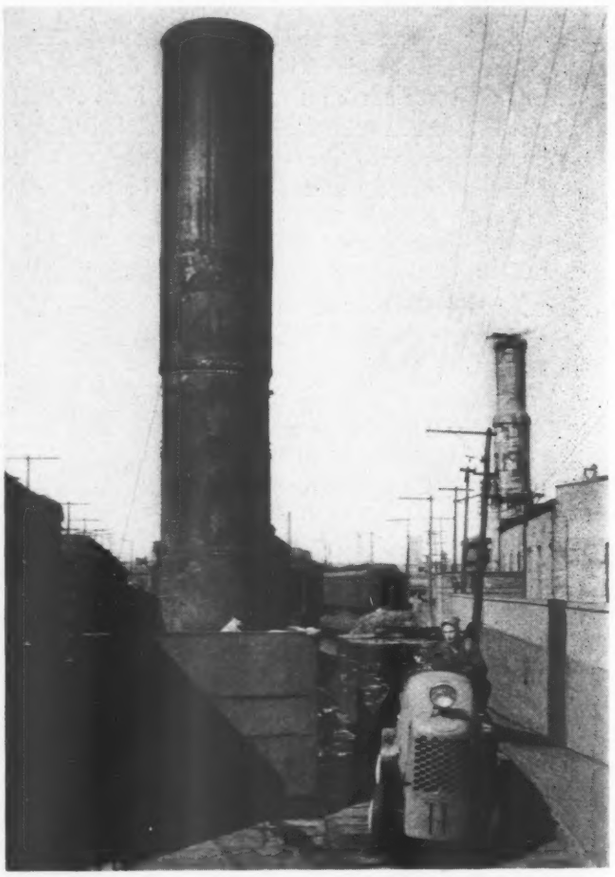
Combating Fly Nuisance At C. & N. W. Coach Yard

An unusually efficient and sanitary method of garbage disposal has been developed and is now in use at the California avenue, Chicago, coach yard of the Chicago & North Western. As compared with the former method of removing garbage from diners, club cars and private cars received at California avenue yard by means of open wheelbarrows, the new method utilizes covered containers with suitable hand cart and power facilities for moving them, so that the nuisance incident to handling garbage about the yard is entirely overcome; flies, rats, mice and bad odors are materially reduced; and an important saving is made in the actual labor of removing the garbage.

Special equipment used in this new method of garbage handling and disposition includes 16 large portable sheet-metal containers built at the local car shops, a two-wheel hand cart of special design for easy movement of individual containers about the yard, a trailer truck and depressed platform or pit centrally located for the accumulation of garbage containers, and a Hebbard gasoline shop mule or tractor which hauls the trailer loaded with eight containers to the incinerator at one side of the yard. The garbage container is made of 20-gage galvanized iron, 21 in. in diameter by 36 in. high, equipped with two handles and a flanged cover made of ⅛ in. steel. This container is fabricated by welding and relatively inexpensive to make.

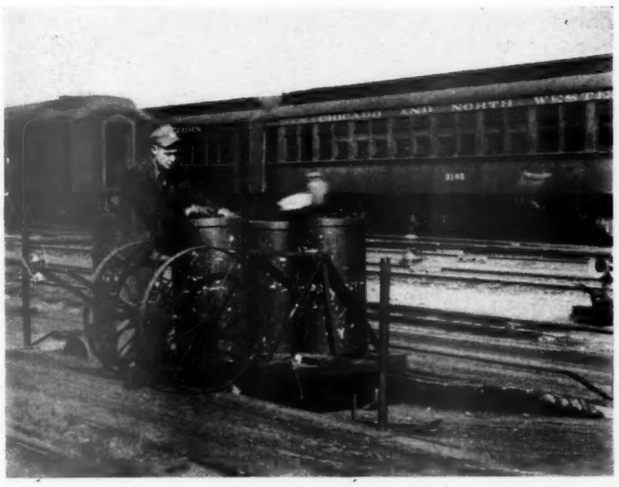
The two-wheel hand cart for moving individual containers also is illustrated. It consists of two 36-in. wheels mounted 27 in. apart on a light steel frame built up of welded ⅜-in. by 2-in. and ⅜-in. by 3-in. strap steel and designed so that, by raising the handle and tipping the barrel slightly, the lower part of the frame readily slides under the base of the barrel which can be tipped in place against a half-round section of the frame and held by means of a safety chain. The frame of this cart is designed so that, with the loaded container in place, it is well balanced and very little pressure is necessary on the cart handle to keep the container in a vertical position while moving about the yard. The base of the cart frame is designed with two stops, front and back, so that when the handle is released the container cannot tip over in either direction. One of the illustrations shows a container mounted in the two-wheel cart and properly positioned at the dining-car door so that the diner garbage can be emptied into it easily and without danger of spilling anything on the ground. The garbage-can cover is shown resting temporarily on the handle of the cart.

A single container and the two-wheel hand cart



The trailer truck spotted ready for unloading at the incinerator

The trailer truck used in moving one or more garbage containers by means of the shop mule, consists of a low-wheel trailer 8 ft. long by 4 ft. wide and 14 in. high. The upper surface is covered with galvanized iron to reduce friction in sliding containers on and off. A ridge pole made of 1½-in. angle iron is supported 27 in. high by diagonal angle iron braces, as illustrated. This ridge pole, removable to facilitate loading the entire truck from either side, is equipped with short safety chains for attachment to the garbage container handles as a safety measure against their being jounced off the truck during



Placing a container on the trailer at the loading pit

movement over roadway which may be rough in some places. The two front wheels of the truck are, of course, arranged to swivel and a have a T-handle tongue with a ring for attachment to the tractor.

The centrally located loading pit consists of a depression in the wood walkway, 5½ ft. wide by 8 ft. long by 10 in. deep, with an inclined approach, also about 8 ft. long, up which the truck is pulled by the shop mule. The pit is surrounded by a 1¼-in. pipe guard, the horizontal side pipes being 37 in. high and arranged to be removable on either side when loading the truck. The use of this pit brings the top of the truck to practically the same level as the garbage container bottom when transported in the two-wheel truck, so that very little manual labor is involved in disconnecting the safety chain and pipe and sliding the barrel onto the trailer truck.

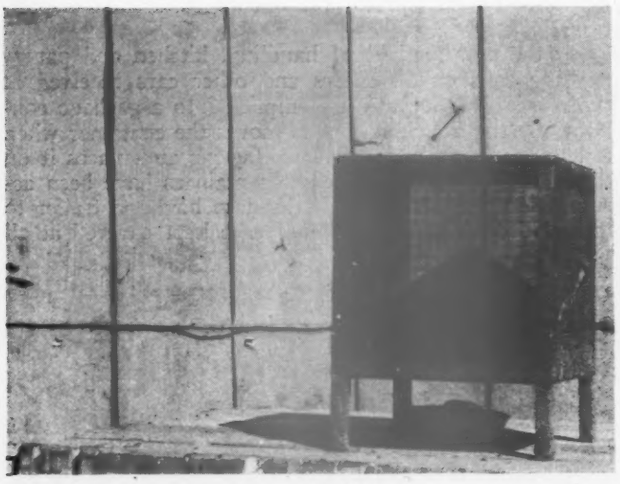
The incinerator, located on the outskirts of the yard, consists of a scrap locomotive boiler, up-ended on a suitable concrete foundation and equipped with a stack extension bolted to the smoke box to give the required additional draft. A sheet-metal door is applied to cover the firebox opening at the elevated platform level and there is a cinder pit beneath the platform for the removal of ashes. The platform also carries a sheet-metal temporary garbage storage bin into which the garbage is dumped from the containers and then shoveled into the incinerator for burning and final disposition.

By the new method of handling, kitchen and pantry garbage cans on all diners and other cars received at California avenue yard are emptied into a garbage container by the car cleaner, who moves the container when full to the centrally-located loading pit and places it on the trailer truck. When eight containers have been accumulated, the shop mule is used to haul the trailer to the incinerator. The containers are kept covered at all

Emptying a diner garbage can into one of the containers

times and after being emptied at the incinerator are steamed out and returned to the pit ready for reloading. This positive prevention of the spilling of garbage and refuse when unloading into wheelbarrows and in movement through the yard has been surprisingly effective in largely eliminating flies, odors and rodents and has

Moving a trailer with eight garbage containers out of the loading pit



Simple but highly effective type of fly trap used at the incinerator

greatly improved the working conditions throughout the yard. In addition, the mechanical handling of the containers in multiple on the trailer has saved extra trips and reduced manual labor, it is estimated, about 50 per cent.

To take care of what few flies are unavoidably present around the incinerator, an ingenious fly trap is utilized, as shown in one of the illustrations. This trap consists of a 12-in. square wooden frame mounted on four short legs and having flat screen sides and top with a cone-shaped bottom, extending upward into the box and having a small hole at the top. An aged half cantaloupe, or other bait, placed under the trap, serves to attract the flies, which when startled fly upward to the cone and work through the hole in the top into the trap. Here they subsequently pass away of malnutrition or are killed by momentary insertion of the trap in the hot gasses of the incinerator. The trap is emptied by removing the screen on the top. A few traps of this kind are all that are now required around the incinerator, whereas formerly they had to be distributed quite generally throughout the entire coach yard.

Handling Device for Punching Steel Plate

In Fig. 1 is shown a handling device that has been recently installed on a punch in the Erie car shop at Port Jervis, N. Y. With this additional equipment one man is enabled to punch holes in steel plate more accurately and safely than was possible before the installation of this equipment. It is designed to handle either small or large pieces of steel plate.

The device was fabricated by electric welding mostly from available scrap material. In fact, the five 1¼-in. steel balls on which rests the plate to be punched are probably the only pieces of material that could not readily be found in any railroad-shop scrap pile. These ball bearings are supported by solid vertical rods that have been cupped out at the end and in which the bearings rotate freely in any direction. These vertical supports are held rigidly in position by frames, built of ¼-in. plate by welding, and bolted to the bed of the punch. The two front bearing supports, on either side of the dies, may be moved in a vertical direction by means of a foot pedal, connecting rod, and levers. A removable fixture, resting on the two front bearings and with an opening cut out for the dies, permits plate to be handled of less width than the distance between the two bearings.

In Fig. 2 is shown the first step in the punching of small steel plate. It can be seen that the bottom of the

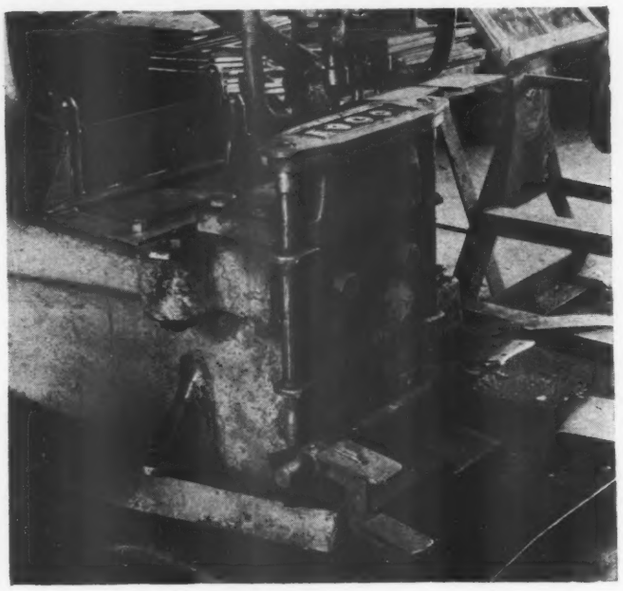


Fig. 1—The steel-plate handling device installed on punch

punch is approximately one inch away from the plate as it rests on the die. In this position it would be necessary for the operator to guess at the relative location of the punch and the center-punch mark on the plate. In-

Fig. 2—Small pieces of steel plate are supported by the fixture resting on the two front bearings

Fig. 3—The plate is elevated up to the punch by movable front bearings operated by a foot pedal

stead of guessing, the operator can raise the plate up to the punch, as shown in Fig. 3, and accurately center the lay-out mark with the punch by merely pressing down on the foot pedal with his left foot. While holding the work in this position, he trips the punch with his right foot.

Steel plate of large area is shown in Fig. 4 supported by all five bearings. This large plate can be moved easily in any direction and, if it extends in front of the punch too far, it can be raised by operating the foot-

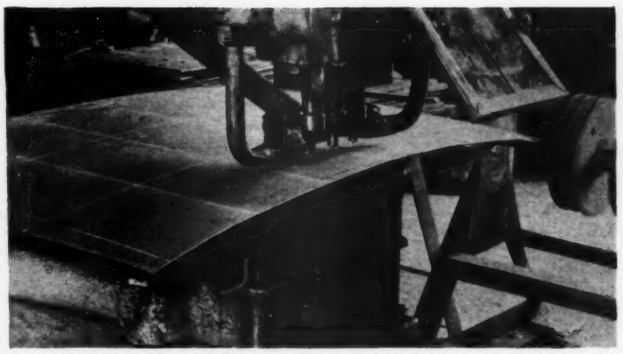


Fig. 4—Steel plate of large area is easily moved in any direction when supported by the five ball bearings

pedal extension shown in Fig. 1. During any of these operations it is unnecessary to have the hands near the moving punch while completing the job.

Device for Checking Wheel Concentricity

The equipment shown below was developed for checking the concentricity of mounted wheels for freight and passenger cars and locomotive tenders—either cast iron or wrought steel. At the left is shown the two floor standards in which are set two large, finely finished rollers. Attached to each standard is a bracket at the end of which is an attachment holding a bar for a dial gage.

The photograph at the right shows the manner in which the dial gage is mounted and, in this case, it is being used to check the tread of the wheel. The revolving head at the end of the bar makes it possible to check other points, such as the flange of the wheels. This device is used, in the shop where the photographs were taken, to check a certain number of mounted wheels each

Part of each day's output of wheels is checked for concentricity with this device

day as they come from the mounting press in order to assure proper mounting as well as a check against the accuracy of the boring mills on which the wheels are bored.

Decisions of Arbitration Cases

(The Arbitration Committee of the A. A. R. Mechanical Division is called upon to render decisions on a large number of questions and controversies which are submitted from time to time. As these matters are of interest not only to railroad officers but also to car inspectors and others, the Railway Mechanical Engineer will print abstracts of decisions as rendered.)

Car Damage— Not Subject to Rule 44

On March 6, 1938, the Philadelphia Quartz Company's empty tank car 510 was inspected and humped at the Cedar Hill, Conn., yards of the New York, New Haven & Hartford. It was then repaired at this point, because a coupler head and both center pins were broken, the side-bearing rollers were missing and the car was off center at both ends. The N. Y. N. H. & H. rendered a bill to the Philadelphia Quartz Company to which it took exceptions, claiming rough handling. The Philadelphia Quartz Company maintained that the car was improperly handled in the Cedar Hill yards as this car had been accepted by the N. Y. N. H. & H. on March 2, 1938, and, therefore, the railroad was liable either for the damage incurred or else for having accepted the car in bad condition at an interchange point. According to the investigation made by the N. Y. N. H. & H., the car was not subjected to any rough handling per A. A. R. Rule 32 nor was there any indication of the car being derailed, cornered or sideswiped.

In a decision rendered November 16, 1939, the Arbitration Committee stated: "From the evidence submitted the damage is classifiable as car owner's responsibility under the provisions of Rules 32 and 44. The contention of the Philadelphia Quartz Company is not sustained."—*Case No. 1777, Philadelphia Quartz Company versus New York, New Haven & Hartford.*

Owner Responsible for Damage Caused by Couplers Passing

Chicago Great Western all-steel box car 87800 was damaged while being switched in the Missouri Pacific yards at Kansas City, Mo., on July 20, 1938. The M. P. made repairs for safety appliance defects for which they billed the C. G. W., and then delivered the car to the C. G. W. at this point with several defects still in existence. A defect card was requested by the C. G. W. on the basis of paragraph (o-2), section 10 of A. A. R. Rule 32. The M. P. declined to accept responsibility, contending that the damage was due to the couplers passing and therefore was the car owner's responsibility. The C. G. W. cited the statement in Rule 32 that the handling line is responsible for the end of car body above the underframe being broken or bent inwardly when not associated with failure of the end sill on the same end. This road also contended that the damage to this car could not have been caused entirely by the couplers passing as photographs indicated that the end of this car was struck by the end of the adjacent car in switching. The M. P. maintained that no cars were derailed, cornered or side swiped nor was section o, Rule 32 applicable as it contended that paragraph 2, section (o) of this rule could not be separated from the rule proper to apply in a case of this kind. The M. P. also called attention to the fact that the damage to the car end had not occurred without damage to the end sill, consequently there could be no claim of telescoping and neither could the operation or damage be classed or considered as cornering.

In a decision rendered April 11, 1940, the Arbitration Committee stated: "No evidence is offered to disprove the statement of the handling line that damage was caused by couplers passing while the cars were on the same track. The car owner's claim of unfair useage is based on the wording of Rule 32, paragraph (o-2), construing this to mean that damage to such an extent is a handling-line responsibility regardless of circumstances. Such an interpretation is erroneous for the reason that the passing of couplers when cars are on the same track can cause damage to the superstructure. The contention of the car owner is not sustained."—*Case No. 1778, Chicago Great Western versus Missouri Pacific.*

Air Brake Questions and Answers

D-22-A Passenger Control Valve (Continued)

606—*Q.—Is the retaining valve connected directly to the brake cylinders with the D-22-A equipment?* A.—The retaining valve is connected to the displacement reservoir in release position of the control valve and controls the release of the brake cylinder pressure through the operation of the relay valve.

607—*Q.—When releasing the brake, at what place in the control valve equipment does the brake cylinder air flow to the atmosphere?* A.—Through the exhaust port of the relay valve.

608—*Q.—What apparatus is used to make a test of the car brakes for the car only?* A.—An apparatus known as the single-car testing device (passenger).

609—*Q.—What pressure is required in the supply line when making this test?* A.—At least 70 lb.

610—*Q.—What must always be done before attaching the test apparatus to the supply line?* A.—Blow out line to get rid of condensation and any foreign matter.

611—*Q.—After coupling the apparatus to the supply line and before coupling to the brake-pipe hose what should be done?* A.—Move the handle on the device to position No. 3 (lap), and open the cock in the supply line. There should be no escape of air from the brake-pipe connection of the testing device or at the exhaust port. If a blow exists, the testing device should be replaced by one in good condition.

612—*Q.—What should be done after it has been ascertained that the testing device is in good condition?* A.—Connect the end marked *BP* to the brake-pipe hose at one end of the car. To the other end of the car couple on a dummy coupling. Open both anglecocks, move the handle to position No. 1 and charge the brake pipe and reservoirs to 70 lb.

613—*Q.—What is the first test?* A.—The application test.

614—*Q.—How is this test made?* A.—Move the device handle to position No. 3 (lap) for five seconds to determine if the equipment is fully charged. With the equipment charged to 70 lb., move the device handle to position No. 5 for 1 to 2 seconds, and then move it to position No. 4, reducing the brake-pipe pressure 10 lb., then slowly return the handle to lap position. Note that the brake-pipe pressure does not continue to drop and that the brake applies.

IN THE BACK SHOP AND ENGINEHOUSE

How the Small Shop Performs Driving-Box Work

In the large shop, where the output of classified repairs may run from 30 to 45 locomotives a month, the work of manufacturing and repairing driving boxes is a specialized job. Considerable thought has been given to the arrangement of facilities in a department devoted entirely to this class of work and such a department is usually self-sufficient in the matter of machine tools, furnaces for melting, and parts-handling equipment. The driving-box department of a large shop naturally presents a problem to the supervisor in charge but it is one of eliminating lost motion and keeping production at a maximum.

At the other end of the scale the driving-box job in a small shop presents just as difficult a problem to the supervisor of that shop, for there is no driving-box department as such, no departmental foreman and the machines and equipment used for the work are the same one that have to perform a multitude of other jobs related to locomotive repair work. The manner in which such work is carried out at the Pen Argyl, Pa., back shop of the Lehigh & New England is an excellent example of small-shop operation and is the basis of this article.

The entire motive-power inventory of the L. & N. E. comprises 47 units of four types: Six-wheel and eight-wheel switchers, Consolidations and Decapods. The locomotives are given general repairs at the Pen Argyl shop at the rate of from 12 to 15 locomotives annually. The driving-box work, therefore, in connection with locomotives going through the shop, involves only about 100 to 140 boxes a year, or an average of less than 12 a month. Obviously, there is no opportunity to specialize the work and it is, therefore, a problem of fitting it in with the other work of the shop.

Worn driving boxes are trued on the planer preparatory to welding on steel shoe and wedge liners

Among numerous other jobs, crown-brass dowels are drilled out and new brasses drilled for dowels on this radial drill

There are no specialized machines and the machines used on this work perform many other locomotive machining operations. Such units at Pen Argyl are listed in Table I.

Some idea of the size of the driving boxes used on the L. & N. E. power may be had from an examination of Table II which shows the driving journal size of four types of locomotives, limits of wear and general dimensions of the largest and smallest box used, as examples.

In view of the fact that the machine-tool units must handle a great variety of parts, mostly in small lots, it is not possible to locate machines to the advantage of any one class or work. Yet, so well arranged is this nine-pit, transverse shop within a 163-ft. by 264-ft. building (housing machine, erecting, boiler and blacksmith departments) that a set of boxes moves only approximately

Table I—Type and Age of Machines Used on Box Work

Name of Machine	Age of machine, yrs.
600-ton Southwark hydraulic wheel press	24
25-in. Lowell vertical slotter	24
5-ft. Cincinnati-Bickford radial drill	3
52-in. King boring mill	3
36-in. by 10-ft. Gray planer	16
30-in. by 84-in. Shipley planer	28
Brass melting furnace — Johnson	10
16-in. Lodge & Shipley engine lathe	24

Table II—Characteristics of Driving Boxes on the L. & N. E. Locomotives

	Journal size, in. Main	Journal size, in. Others	Allowable reduction in journal diameter, in. Main	Allowable reduction in journal diameter, in. Others	Principal Dimensions of Boxes* Extreme height of box, in.	Extreme width of box, in.	Hub face diam., in.	Distance between toes, in.	Shoe and wedge face width, in.	Rock in shoe and wedge flanges, in.
0-6-0	9 × 12	9 × 12								
	10½ × 13	10½ × 13	½	¾	....	....	..	....	....	.....
0-8-0	10 × 12	10 × 12	½	¾	....	....	..	....	....	.....
	12½ × 14	11 × 14	½	½	....	....	..	....	....	.....
2-8-0	8 × 8½	8 × 8½	½	¾	....	....	..	....	....	.....
	8 × 8½	7½ × 8½*	½	½	18¼	15½	15	8	5 21/32	⅛ in. 12 ¼ in. straight
	10 × 10	9 × 10	½	¾	....	....	..	....	....	.....
2-10-0	13½ × 14*	11 × 14	½	½	27⅜	27¼	26	14¼	9 1/16	⅛ in. 12 2 in. straight

* Dimensions of smallest and largest box handled as a typical example.

1,150 ft. in passing through all of the operations shown in Table III, from the time of removal from a locomotive to re-application.

The shop is equipped with a Whiting 200-ton hoist on No. 1 erecting pit which handles all but the lightest locomotives. The erecting bay is served by a 35-ton Whiting crane with 10-ton auxiliary hoist. When a locomotive is unwheeled, the boxes are removed and placed in a metal basket at the cleaning vat located adjacent to pits No. 1 and No. 2. Here they are cleaned with Oakite No. 22 and sent to the 52-in. King boring mill where the hub liners are cut off, thence to a 5-ft. Cincinnati-Bickford radial drill for drilling out crown-brass dowels. The brasses are inspected for looseness and wear and, if they must be removed, go to the 600-ton Southwark press. The maximum allowable wear is ⅜ in. to ½ in. below original. New crown brasses are turned on the boring mill, sent to the 27-in. by 84-in. planer to have the toes planed and back to the 600-ton press where they are put in the boxes. Then the boxes go to the radial drill for the redrilling of hub-liner dowels, after which they are sent to the smith shop for pouring the hub liners. The brass is melted in an oil furnace with a 9-in. by 12-in. crucible. This will heat enough metal for four small or three large boxes. Old brass is remelted for this purpose.

If new shoe- and wedge-face liners are needed, the faces are trued up on a planer and steel plate liners welded on. Welded steel liners are also used on driving-wheel hubs. As an example, a box which was 11½ in. over shoe and wedge faces when new receives 5/16-in. liners when worn to 10⅞ in.

The shoe and wedge faces are then trued up on the planer so that the bore is central and the shoe and wedge faces parallel. The toes of these boxes spread as much as 1/32 in. to 3/16 in. in service.

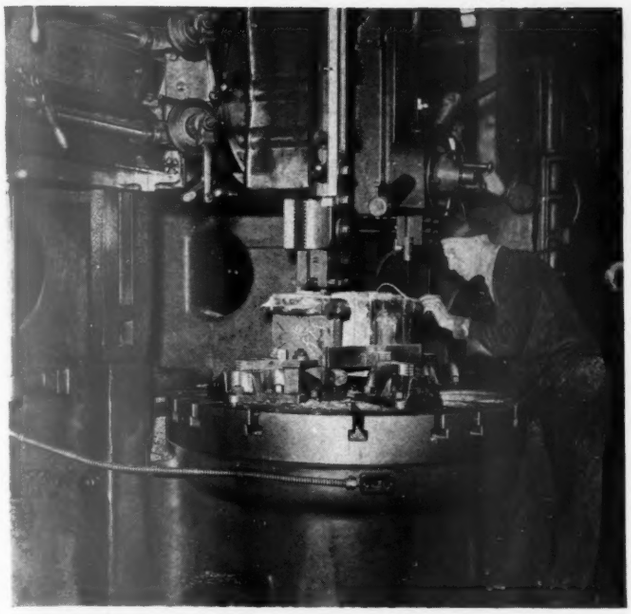
New dowel plugs are made on an engine lathe and after the holes have been redrilled, the new brasses and the plugs are driven in and the boxes go to the King mill for boring the brasses and facing the hub liners. One illustration shows the method of centering the box on the boring-mill table. The marking gage shown is used to scribe off, on the brass, the location of shoe and wedge faces. These faces having been previously planed equidistant from the box center line, and parallel, the pointer on the tool post indicates which way the chuck jaws should be moved to center the box.

Gage used in centering the driving-box on the boring-mill table

Table III—Driving-Box Operations at Lehigh & New England Shop, Pen Argyl, Pa.

Operation	Machine Used	Operation Time, Per Box, Except As Noted: Small Boxes	Large Boxes
1—Remove boxes		4 hr. (8 boxes)	8 hr. (10 boxes)
2—Metal basket to cleaning vat		2 hr. (8 boxes)	2 hr. (10 boxes)
3—Clean with Oakite No. 22		6 hr. (8 boxes)	8 hr. (10 boxes)
4—Cut off hub liners (cast brass*)	52-in. King boring mill	30 min. per box	40 min. per box
5—Drill out five or six dowel holes in hub face dovetail	6-ft. Cincinnati-Bickford radial drill	20 min.	20 min.
6—Inspect for loose brass or crown wear		30 min.	40 min.
7—Press out old brass, if necessary	600-ton wheel press	15 min.	20 min.
8—Turn outside of new crown brass	52-in. King boring mill	50 min.	70 min.
9—Lay out brass with three-point gage		10 min.	10 min.
10—Plane toes of brass in V-blocks	27-in. × 84-in. Cincinnati planer	45 min.	60 min.
11—Press brass in box	600-ton wheel press	20 min.	25 min.
12—Redrill dowel holes for hub liners	Cincinnati-Bickford 6-ft. radial drill	20 min.	25 min.
13—Boxes to smith shop to pour hub liners	Oil furnace with 9-in. × 12-in. deep crucible	60 min.	130 min.
14—Weld on new steel shoe and wedge face liners	Electric welder	40 min.	60 min.
15—Plane shoe and wedge face	Gray 36-in. × 10-ft. planer	120 min.	150 min.
16—Make two brass crown dowel plugs	Engine lathe	20 min.	20 min.
17—Drill crown brass for dowels and drive dowels	Radial drill	20 min.	25 min.
18—Bore brass and face hub liner	52-in. King boring mill	75 min.	150 min.
19—Fit grease cellars		30 min.	40 min.
20—Fit eight boxes to journals (one machinist, one helper)		12 hr. (8 boxes)	16 hr. (10 boxes)

* National Bearing Metals formula (same as journal brasses and crown brasses).



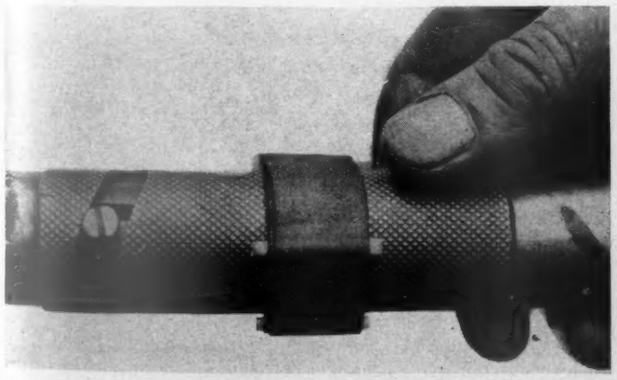
Hub liners are faced and bearings bored on the King boring mill—New crown brasses are also turned on this mill

When the set of boxes has been completed the cellars are fitted ($\frac{1}{64}$ in. loose) and they go to the erecting floor for re-application.

The time required for the several operations on large and small boxes is shown in Table III.

Emergency Grip for Air Motor Throttle

The knurled throttle sleeve on many pneumatic motors, drills, and other compressed air tools is often hard to keep regulated and operate with the precision required on many jobs. If the hands are moist or covered with a light film of oil or heavy gloves the throttle sleeves are not easy to grip or to turn slightly. By using some electricians insulating tape and several matches, the handy aid to the grip shown in the photograph can be made. Make one or two turns of the tape around the sleeve, then lay in three or four pieces of match or other small slivers of wood. Wind one or two turns of tape around them, pressing down firmly. This makes a number of ridges or humps, comfortable and easy on the fingers, yet affording an excellent grip on the throttle sleeve.



Emergency grip for air motor throttle made from tape and matches

This simple emergency grip is easily applied and removed when through using the motor.

Instructions for Maintaining Diesel-Electric Equipment

In the April issue of the *Railway Mechanical Engineer,* page 131, there appeared an abstract of a paper by H. V. Gill, supervisor of Diesel locomotives, Atchison, Topeka & Santa Fe, in which mention was made of an instruction bulletin issued by that road. That part of the bulletin pertaining to the Diesel engine was published in the May issue, page 202. The following is that portion of the bulletin relating to electrical equipment and lubrication.

Electrical Equipment

Inspection, Testing, Repair and Cleaning of Generators and Motors—Electrical equipment must be kept clean and dry to secure proper service without unnecessary expense. All generators and motors should be carefully inspected for loose connections; worn bushes; weak brush tension; loose or worn brush holders; eccentric or grooved or burned or dirty commutators; loose band wires; loose or broken fans. Any indication of excessive heat should be investigated. Any dirty or oily conditions should be corrected by wiping out oil or grease using clean dry rags. All wiring should be securely clamped to prevent chafing of insulation. Any chafed or worn insulation should be repaired at once to prevent grounds. Clean, dry air at pressure not to exceed 50 lb. may be used to blow out dust, etc., from motors and generators. Carbon tetrachloride, instead of gasoline, should be used for washing electrical equipment to eliminate fire hazard. Traction motors must be kept clean and in first-class condition to eliminate failures following the above practices. Particular attention should be given to prevent oil or water getting into the motor. Attention should be given to the traction-motor nose spring assembly and any excessive wear should be corrected.

High-Voltage and Low-Voltage Cabinets—These cabinets must be kept clean and dry—They may be blown out with clean, dry, compressed air. They should be examined for loose panels and poorly secured wiring, and any indication of the possibility of insulation chafing should be corrected. All contactors, reverse current relays, switches and resistance units should be examined for loose connections, burned or worn-thin contacts; proper contact tensions, proper air gap, proper wipe of contact and contact tips must fit together uniformly over the entire surface; moving parts of the contactors and switches must work freely. Where the contactors operate automatically the sequence of opening and closing should be checked. Control air lines and reversing valves should be tested to be sure they are clean and open.

Control Circuits—Control circuits should be checked for connections; worn insulation; dirty, oily condition or accumulation of water. Control circuits must be checked for proper sequence of operation of contactors and throttle control.

Main Contactors and Reverse—The main contactors are to be inspected for loose connections; worn parts; air leaks; sluggish operation; burned or worn thin contact tips and burned shunts. Main contactors must operate snappy and in proper order or trouble will result. The reverse must be kept clean—may be lightly lubricated with a light coat of vaseline or high-grade roller-bearing grease. Contact fingers must have the required

tension. Burned contact fingers or shunts or burned surface of the reverser drum should be corrected. All connections at the reverser must be kept clean, dry and tight.

Compressor Governor—The air-compressor governor should be thoroughly cleaned and tested for proper operation. Cutting-in and cutting-out pressures should not vary; if so, the sluggish condition of the governor should be investigated and corrected. Any report of erratic operation of the air compressor or the air-compressor governor must be investigated and corrected. Whenever the compressor is reported, or when it shows weakness at the time of the orifice test, the valves should be removed and the carbon accumulation cleaned out. Any defective parts or valves, such as unloading springs, unloading plungers, cages or seating springs, should be replaced. No carbon should be allowed to enter the cylinders.

When necessary the piston rings are to be renewed in the air compressor.

Check and Clean Electrical Grounds—All Diesel-electric locomotives are equipped with ground protective relays which will open up the power and control circuits if grounds exist. If the ground protective relay should not function quickly enough, the electrical equipment will be damaged. All grounds, or short circuits, must be removed or failures will result.

Head and Cab Lights and Engineroom Lights—Head and cab lights, and engineroom lights, must be maintained in good, safe operating condition.

Traction-Motor Cables—The traction-motor cables must be given special attention both inside and outside of the motors. Where the insulation is chafed or worn, repairs must be made and the condition which caused the chafing removed. All sharp bends should be avoided. When coupling up the traction-motor cable connectors, the connectors should be carefully taped over to prevent moisture from entering. Be sure the bolts that secure the two halves of the cable connectors together are tight.

Traction Motor-Drive Gears—The traction motor-drive gears on the motor and the axle should be carefully checked for excessive wear, broken or badly chipped teeth whenever the motor is removed. They should also be examined through the opening in the top of the gear case at least once a month for defects and lubrication.

Engineman's Control Station—This check should include an examination of the control stand; the control-station switches and the dead-man pressure-control switch. This inspection should be carefully handled. Check for loose connections, poor fuse clips, clean control-drum contacts, weak or worn contact fingers, wear-in throttle or connecting gearing. Test the dead-man pressure control switch for proper operation.

Batteries—Batteries should be kept clean and dry. Avoid overflushing, as the electrolyte will run out, causing grounds. Check the gravity on the road engines daily; on the switch engines, not less frequently than once a month. When the batteries are reported, a check of the charging equipment should be made for the proper charging rate and check for grounds.

Steam Generator Controls—The steam generator motors, the control panels and the wiring should be given the same servicing and inspection as the other contractors and the wiring in the power plant. *The safety devices should each be tested for proper operation every 30 days.* Whenever any report is made on the steam generator, a thorough check should be made. Safety devices should be tested, if required. The steam generator should be washed according to special instructions.

Wiring Connections—Wiring connections should be checked for tightness, loose terminals at sockets, and any indication of heating should be investigated. The connections should be spaced so that they cannot touch.

Relays—Relays should be checked for worn thin or burned contact tips; condition of blowout coils; wipe of contact tips; air gap; worn shunts; wear-in pins; the armature return spring should be in good condition; air-operated contactors should be checked for proper air pressure and all leaks should be corrected. Sluggish operation of contactors should be corrected.

Voltage Regulators—The voltage regulators must be given careful attention regarding loose connections, burned or dirty contacts, burned open resistances, voltage setting should be checked as frequently as possible to insure that the regulator is maintaining the proper voltage. Each time the regulator voltage is checked the exciter field current must also be checked. This is a very important item of maintenance and should not be neglected.

Lubrication

Lubrication—Electric Motors and Generators—Lubricate the armature roller bearings using an approved grade of special grease sparingly. Do not over-lubricate.

Road passenger locomotives: Follow instructions on Form 1226-DS.

Switch locomotives: Grease as follows:

Small motors	2 oz. of grease
Main generator	6 oz. of grease
Auxiliary generators	3 oz. of grease
Exciter generator	3 oz. of grease

Traction Motor Armature Bearings—Follow special folio instructions.

Air Compressor Motors Oil Lubricated—Check the oil level at least once a week; refill the oil well to restore the level to a maximum depth. If the oil leaks away too soon, check the bearings for excessive wear. Only an approved grade of oil (SAE 30 gas-engine oil).

Drain Oil-Diesel Engines—Change the crankcase oil in the Diesel engine crankcases as instructed. Used oil should be placed in clean drums and turned over to the stores department for shipment to Topeka, Kan., where the oil will be re-refined. Do not allow the fuel oil and dirt when the crankcase is washed to be drained into the lubricating oil. Show the date of the last oil change on the form. All oil must be removed from the tanks, the camshaft troughs and the engine crankcases.

Change Oil in Air Compressors Every Three Months—The oil in the crankcases of the air compressors should be changed every three months of service. Used oil should be sent in for re-refining to Topeka, Kan.

Main Contractors and Reverse Air Cylinders—Use a highly refined chemically-neutral, non-freezing oil. Not less frequently than each 90 days the cylinder heads should be removed and the interior of the cylinders given a light coat of special roller-bearing grease. If the packing leathers are hard they should be renewed.

Oil Level in Main Governor and Overspeed Governor on Diesel Engines—Check daily; if required, add approved oil.

Truck Journal Boxes—On switch engines check as frequently as possible adding oil of an approved grade if required. Check road engines as indicated on Form 1226-DS.

Truck Center Castings—Brake Rigging—Truck Pedestal Jaws—Lubricate with engine oil not less frequently than every 30 days on switch locomotives, and every trip on road locomotives.

Throttle-Control Linkage—Lubricate with special roller-bearing grease every 30 days for switch locomotives, and as indicated on the form for road locomotives.

Drain and Refill Crankcase of Steam Generator Feedwater Pump—Drain and apply fresh oil every 90 days. Use only an approved grade of oil.

Traction Motor Gears—Lubricate with an approved grease at least once a month for switch locomotives, and as indicated on the form for road locomotives.

Repack—Waste—Type Traction Motor Armature Bearings—These bearings should be repacked every 30 days. At the time of repacking the bearing, the oil well should be examined for flakes of bearing metal. Clearance of the bearing may be checked with a feeler gage. Oil in the well should be checked for water content using a syphon furnished. If water is present, all oil must be removed from the oil well. See the instruction book for details of packing bearing. Use only approved long strand wool waste for packing and an approved oil for lubrication.

Examine and Repack Traction Motor Axle Suspension Bearings—These bearings should be repacked every 90 days. Use only approved long strand wool waste for packing and an approved oil for lubrication.

Locomotive Boiler Questions and Answers

By George M. Davies

(This department is for the help of those who desire assistance on locomotive boiler problems. Inquiries should bear the name and address of the writer. Anonymous communications will not be considered. The identity of the writer, however, will not be disclosed unless special permission is given to do so. Our readers in the boiler shop are invited to submit their problems for solution.)

Types of Crown-Sheet Patches

Q.—In applying a welded patch to the front of a crown sheet of a locomotive firebox should the patch be made saw-tooth or rectangular shape?—J. M. D.

A.—The shape of a crown-sheet patch is of little importance from a standpoint of strength, as the strength of the structure is not dependent upon the strength of the patch. The crown sheet is supported by the staybolts and the load on the patch is carried by the staybolts.

The shape of the patch should be as uniform as possible and large enough to replace the damaged portion of the sheet. It is not necessary that any uniform shape be adopted, the shape of the patch being governed by the area that is damaged and requires renewing. The joint between the patch and crown sheet should be spaced evenly between the two rows of staybolts.

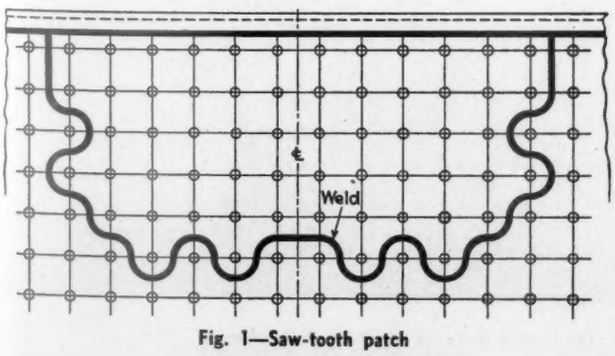


Fig. 1—Saw-tooth patch

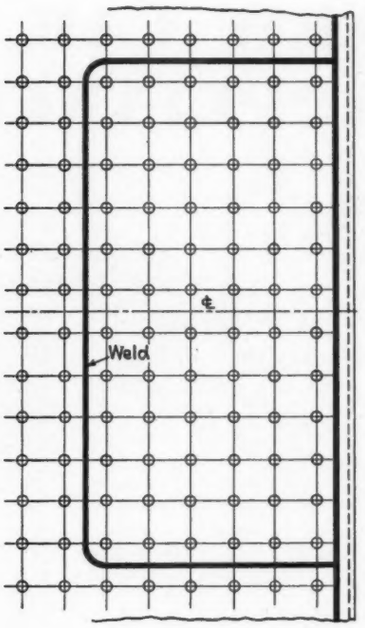


Fig. 2—Rectangular shaped patch

Fig. 1 illustrates what would be considered a saw-tooth patch. Its advantages are that a maximum amount of welding is obtained for securing a given patch and by zig-zagging the weld, the weld is supported by three rows of staybolts instead of two. Its disadvantage is its irregular shape which causes greater difficulty in fitting and applying.

Figs. 2 and 3 illustrate a rectangular and diamond shaped patch, respectively. These types of patches are in common use, are simple to make and apply, and are for all practical purposes the most logical types of patches to be used in this location.

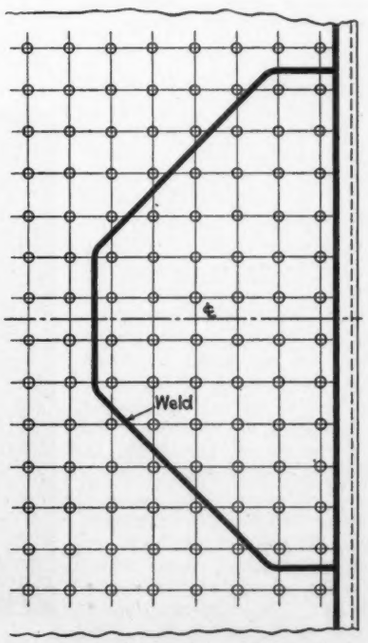


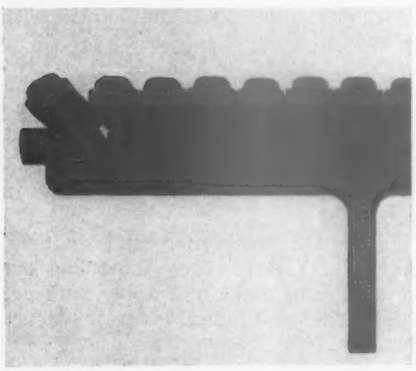
Fig. 3—Diamond-shaped patch

NEW CAR AND LOCOMOTIVE APPLIANCES AT THE EXHIBIT

Improved Hulson Grate Design

The Hulson 12-in. Tuyere-type grate is a new design in that the carrier bars are located on 12-in. centers instead of the previous standard 10-in. centers. The carrier bar has been changed and a locking arrangement has been developed which has eliminated the loss of units in service.

The unit for the 12-in. center grate measures 2¼ in. wide by 11¾ in. long and weighs 8¾ lb. It is available in any net air inlet from 12 to 26 per cent of the grate surface and is made of close-grained grey iron having a tensile strength of 30,000 to 45,000 lb. per sq. in. The sections through the unit are uniform for even heat transfer. Sixty-six to 78 per cent of the air inlet through the total grate area is in the tuyere opening. The "straight" draft air opening at the ends of the fingers is limited to ¾ in. Ash-pan loss when firing up and in service is negligible with numerous tests showing a loss of less than ¾ lb. of fine coal or dust per square foot of grates surface.



The last Hulson grate finger is "rolled" into place locking the units into position

The carrier bar is a stubby I-beam having trunnions 2¼ in. in diameter with a bearing surface 1¼ in. long. A ¾-in. steel pin is cast in the trunnion extending 2 in. into the base of the bar, eliminating breakage or failure of the trunnion. The top surface of the carrier bar is 2½ in. wide and the bearing surface is 1½ in. in width.

The units do not oscillate in service and, for this reason, the sides of the units are not subjected to excessive wear which would increase the air space after a long period of service. The units are applied only at one end of the carrier bar. The last unit is "rolled" into place as indicated in one of the accompanying illustrations. Two-thirds of its bottom face is engaged by the carrier rib and due to this generous bearing the unit can not be dislocated or lost under any operating condition.

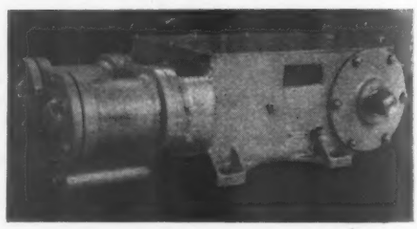
The Hulson 12-in. grate assembly has a 5¼-in. free opening in full open position

In full open position, the 12-in. grate has a 5½-in. free opening. This large free opening permits any section of the fire to be dumped quickly and eliminates the need of a drop grate. The grate shakes easily, yet the carrier-bar trunnions are placed sufficiently high on the units to lower the center of gravity so that a disconnected grate will remain level.

The weight of the 12-in. unit assembly averages from 68 to 78 lb. per sq. ft. depending upon the ratio of the length to the width of the firebox and the number of sections required in width. The three-section assembly has an area of 94.91 sq. ft. in a firebox 126¼ by 108¼ in. The two-section assembly has an area of 70.28 sq. ft. in a firebox 120⅛ in. by 84¼ in. These grates are manufactured by the Hulson Grate Company, Keokuk, Iowa.

Martin Locomotive Stoker

The features of the Martin stoker, manufactured and sold by the Locomotive Finished Materials Company, Atchison, Kan., are its all-steel construction, ease of application, the method of coal distribution by means of adjustable jets on the distributing plate and the hammer-mill type crusher box which controls lump size. The total weight of the stoker complete with a stoker engine is approximately 3,950 lb.



The Martin stoker engine

The Martin stoker is of all-steel construction

Only 1,685 lb. of this equipment is on the locomotive with the stoker engine installed on the locomotive frame. This permits the economical installation of the stoker engine on the locomotive instead of on the tender, thereby eliminating the need of reducing the water capacity in small tenders to furnish space for the stoker engine. It is not necessary to redesign or enlarge the fire-door opening in the boiler head to apply this stoker.

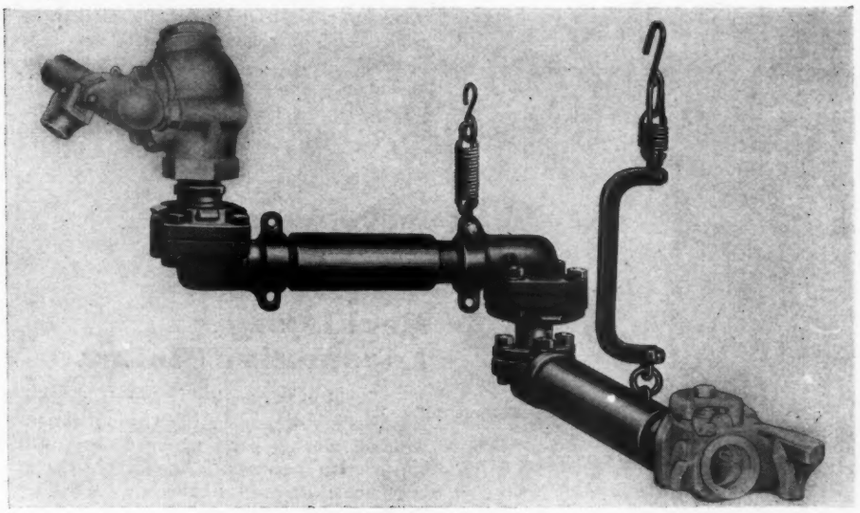
The conveyor trough is made of boiler plate welded to the gear box and to the crusher box. The gear cases, ball joints, conveyor screws, and the riser-conduit elbow are of cast steel. The conduit is made of steel pipe, while the riser conduit is of welded-plate construction. The stoker has large bronze bearings in the crusher box and heavy-duty roller bearings in the gear box. The gears are of heat-treated alloy steel.

The stoker has a coal crusher with extended prongs which breaks large lumps of coal into clusters instead of pulling these lumps against the plate and thus creating an excessive torque on the conveyor screw and the rear-end bearings. These clusters pass through a cowl between the conveyor screw flight and the conveyor screw in sizes approximately 4 in. by 6 in. which is too large for economical firing. Then, by the action of breaker hammers, the coal is reduced to the proper size for firing.

The riser conduit is rectangular in shape from its base to its discharge end, which permits the coal to be delivered evenly in a loosened mass onto the distributing plate. As the coal pyramids inside the fire-door hood on top of the distributing plate, the coal falls in front of the jet bolts, and is from there distributed over the fire-box area. As the jet bolts are adjustable, the accurate adjustment of the jets may be made for proper coal distribution.

Power Reverse Gear

The cross-sectional diagram shows the Leathem power-reverse gear which is being introduced by the Paxton-Mitchell Company, Omaha, Neb. The principle of this gear is embodied in an air-cushioned piston head with a reciprocating valve inside, this arrangement producing instant equalizing pressure on both sides of the piston head through a one-to-one ratio of piston travel to valve travel.



The Barco FT-2 steam-heat connection—the U-shaped bar in the safety support gives clearance for the air hose

Through this design, an immediate reaction takes place to any ordinary leakage and to forces applied through the valve gear, eliminating the possibility of creeping from these sources. There are only two pins to be maintained between the reverse lever and the operating valve. This reduces lost motion to a minimum and eliminates another cause for reverse gears creeping. With the equal ratio of piston travel to valve travel, the engineer has constant, sensitive control over the valve setting, resulting in efficient and economical locomotive operation.

Horizontal Steam-Heat Connection

The Barco FT-2 horizontal steam-heat connections manufactured by the Barco Manufacturing Co., Chicago, are used on streamlined cars where conditions do not permit the A. A. R. recommended location of end valves. They have all of the important features of the standard A. A. R. FT-1 and many of the parts are interchangeable.

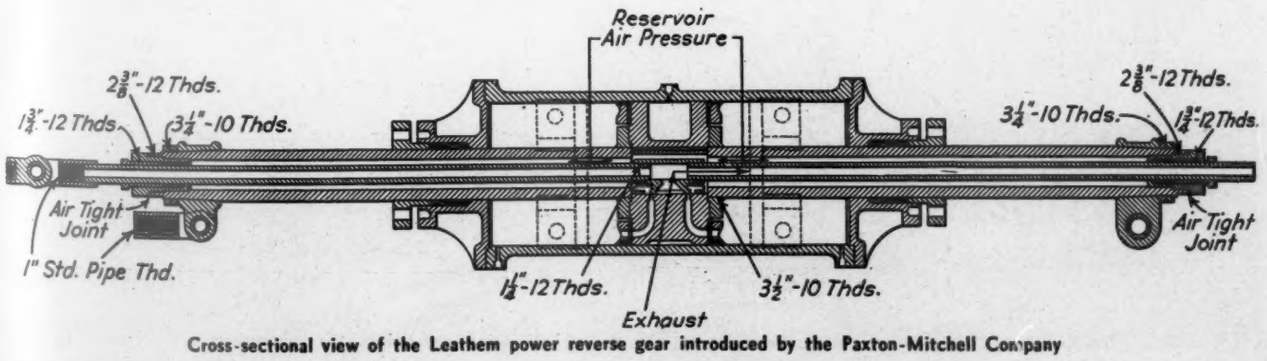
They have been improved by the application of hardened alloy-steel wearing parts instead of the bronze wearing parts formerly used, and 40 per cent additional flexibility has been obtained. These connections are made in 2 and 2½-in. sizes. In addition to the 2½-in. size being a new connection, the 2-in. size has been changed by the use of a U-shaped bar in the safety arrangement for holding up the connection. This was done in order that this safety appliance would not interfere with the rubber air hose.

Oil Divider for Lubricating System

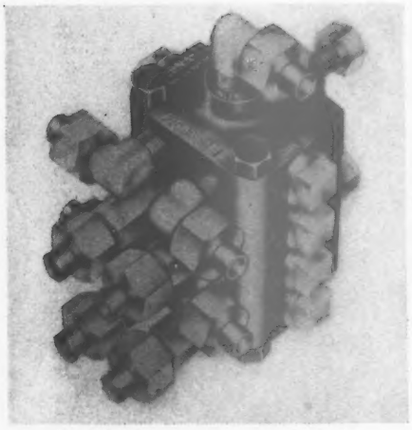
The Edna positive oil divider is a precision device of the hydraulic type with only three or four moving parts, depending upon the number of outlets. These dividers will operate from atmospheric pressure to 10,000 lb. per sq. in. without any harmful effects to the device and without impairing the accuracy of the discharge.

The outstanding feature of the divider is the hydraulic lock. To prevent the plungers from assuming positions on center, thereby rendering the divider inoperative, a principle, known as a hydraulic lock, is employed. This lock acts to hold the pistons alternately to the ends of their strokes before the next sequence in the oil cycle of the divider takes place.

The divider is furnished with from two to eight outlets with double as well as



Cross-sectional view of the Leathem power reverse gear introduced by the Paxton-Mitchell Company



The Edna eight-feed oil divider

single discharges in the same device. This permits twice the amount of oil to be delivered from one or more outlets as is delivered from the remaining outlets in the same divider. This result is accomplished ordinarily by the use of plungers having twice the area of the standard plunger.

As an example of what can be accomplished, the following arrangement is in service: One feed from an eight-feed mechanical lubricator on a roller-bearing equipped locomotive is connected to an Edna two-feed divider and outlets from this divider are connected to two eight-feed dividers. The discharges from these lubricate eight engine-truck pedestal faces and eight points on the front and main wedges. Six feeds from the same lubricator are connected to six eight-feed dividers, the oil from these being used to lubricate driving and trailer-truck pedestal faces as well as the wedges. The remaining one feed from the lubricator is connected to a six-feed divider, the discharges from which lubricate the guides and link blocks. There is, therefore, a total of 70 machinery points lubricated through the use of dividers and an eight-feed lubricator.

This device requires no repairs, inspection or maintenance and needs only a periodical cleaning. It is a product of the Edna Brass Manufacturing Co., Cincinnati, Ohio.

Berkley Locomotive Stoker

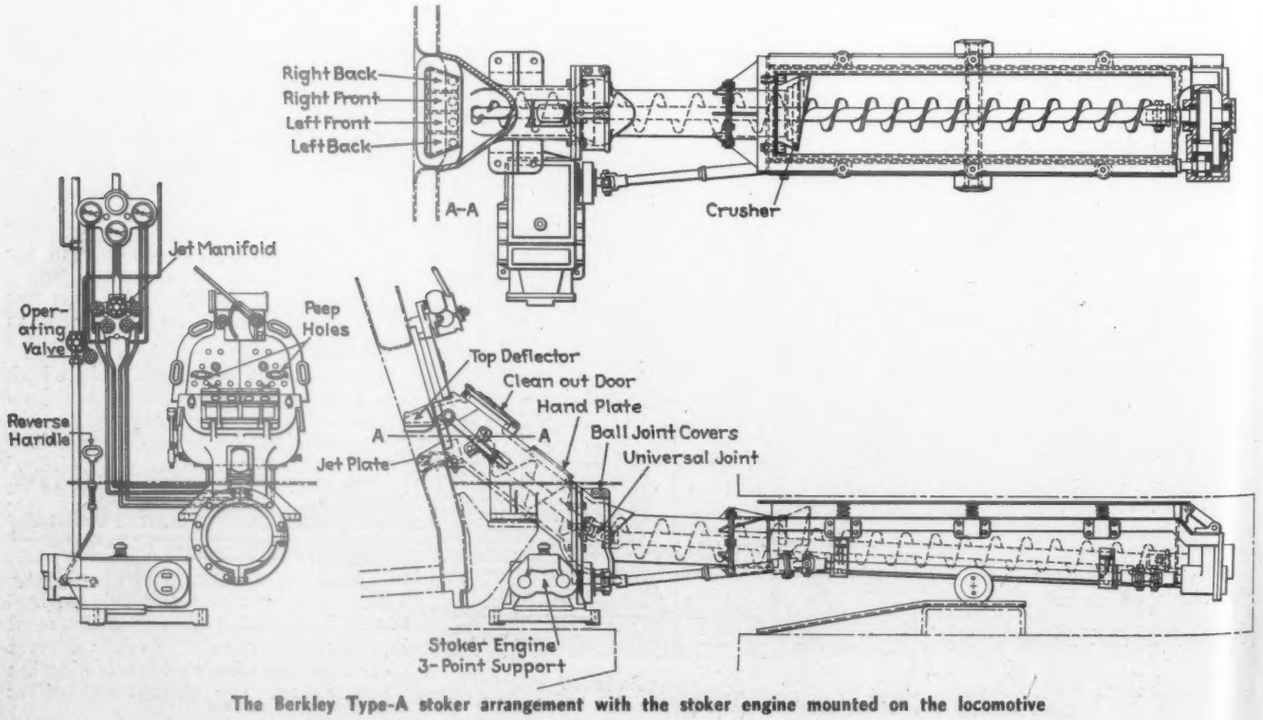
The Berkley locomotive stoker is a simple machine of proven engineering design with all moving parts mounted on sealed anti-friction bearings. Applications have been made on several railroads, including the Seaboard, which has had 30 in service for over two years.

The stoker comprises three principal parts—the stoker engine, riser, conduit, and tender-conveyor unit and weighs 4,017 lb. The stoker engine is designed for either saturated or superheated steam with all moving parts completely enclosed and oil sealed. The cylinders, piston valves, reverse valves and cylindrical crosshead guides are bushed with removable nickel cast-iron sleeves, and the crankshaft is mounted on ball bearings. The cylinders, valves and reverse valve receive valve oil from the mechanical or hydrostatic lubricator on the locomotive, and the remainder of the engine is lubricated by a splash system requiring six quarts of oil. The engine is reversed by a manually operated valve built integral with the engine and requiring no piping. The location of the engine is optional; it can be placed on the locomotive, tender, or at the rear of the gear box.

The riser conduit is connected with the ball of the tender unit beneath the cab deck and extends upward through the deck with its upper portion conforming to the contour of the fire-door opening. In the top portion of the conduit is a clean-out or inspection door which is convenient for removing clinkers from the firebox. If any foreign matter should get into the riser conduit, it can easily be removed through the clean-out door or hand-plate which is located at the lower portion of this unit.

The tender-conveyor unit is supported on two wheels mounted on roller bearings with the track secured to the tender. The unit consists of a trough, trough screw, crusher and gear box. The length of the conveyor trough may be varied to suit the length and capacity of the tender. The amount of coal delivered to the conveyor trough is controlled by side plates that are arranged in the tender deck. All bearings are of the roller or ball type, properly lubricated and oil sealed. The trough screw is continuous from the gear box to the ball joint of the riser conduit and is connected to the conduit screw by a universal link, two blocks, two bolts, and two pins. The thrust load of the riser conduit screw and the trough screw is taken by two double-row ball bearings in the gear box. All the gears are made of special heat-treated steel, mounted on ball bearings and oil sealed. The thread type crusher is located at the forward end of the conveyor trough, crushing the coal to the proper size and supplying it evenly and continuously to the riser conduit.

The top deflector does not extend into the fire box. Its use assures satisfactory distribution of coal to the back corners of the firebox and it also deflects fine coal to the fire bed which otherwise would be lost through the stack. The jet apron fits in the lower portion of the upper part of the riser conduit and is held in place by two



The Berkley Type-A stoker arrangement with the stoker engine mounted on the locomotive

tapered set screws on either side of the riser conduit. To remove the jet apron it is only necessary to slack off the two set screws and disconnect the four ½-inch pipe unions below the conduit. The number and size of holes used in the jet apron are variable to suit the size of firebox and the type of coal used. It is divided into four compartments, each of which is controlled by a separate valve located in the jet manifold.

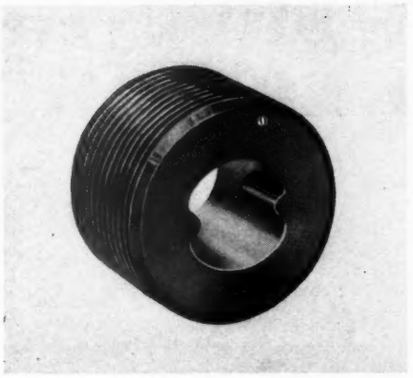
A gage is located on each side of the steam-gage panel with the black hands of these gages indicating the back corners and side sheets and the red hands indicating the front of the firebox. These two gages give the fireman an accurate reading of the jet pressure which will vary from 10 to 45 lb. per sq. in., depending on the weight of the coal being distributed. On the same gage mounting is located a steam gage showing the stoker engine and boiler pressures.

The stoker is made by the Berkley Machine Works & Foundry Co., Inc., Norfolk, Va.

Locomotive Staybolt-Hole Bushing

The purpose of the Lewis Sealtite staybolt hole bushing is to furnish a simple and effective means of maintaining standard staybolt diameters. When repairing locomotive boilers, staybolts are frequently renewed and in this operation it is necessary to ream and re-tap the staybolt holes. The holes become enlarged beyond the maximum allowed diameter after they have been reamed and re-tapped several times. To correct this it is sometimes the practice to apply a patch or to weld up the staybolt holes. These bushings eliminate the need for patching or renewing the throat and wrapper sheets.

The bushings are made of double-refined staybolt iron manufactured to the customer's specifications. Two lugs on the inside of the bushing make it possible to apply and tighten the bushings with an air motor. After the bushings are applied, they are drilled and tapped to suit the

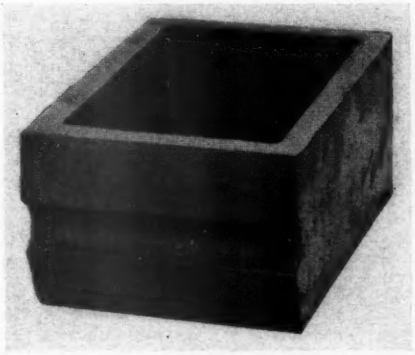


The Lewis Sealtite staybolt-hole bushing

staybolts. The bushing is a product of the Lewis Bolt & Nut Company, Minneapolis, Minn.

Locomotive Spring Band

Stanfast spring bands have solid corners, are free from burning, are of uniform



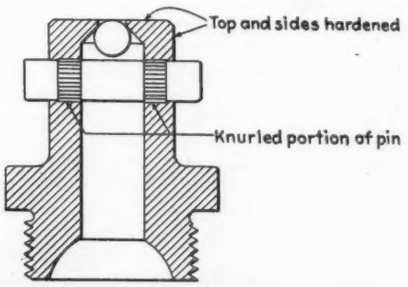
The Stanfast spring band

thickness, and require no welding. They have a tensile strength of 70,000 lb. per sq. in. and an elastic limit of 36,000 lb. per sq. in.

There is no difference in the application between the home-made forged or welded iron band and the Stanfast band, which is made to the same size and tolerance as the home-made band. It is the Stanfast band's "resistance to stretch" which causes it to give an economical performance on over 40 railroads that have used it. This spring band is a product of the Standard Brake Shoe & Foundry Co., Pine Bluff, Ark.

Improved Spee-D Filler Neck

An improved filler neck for application to connecting rods lubricated by the Spee-D method has been developed by the Reliance

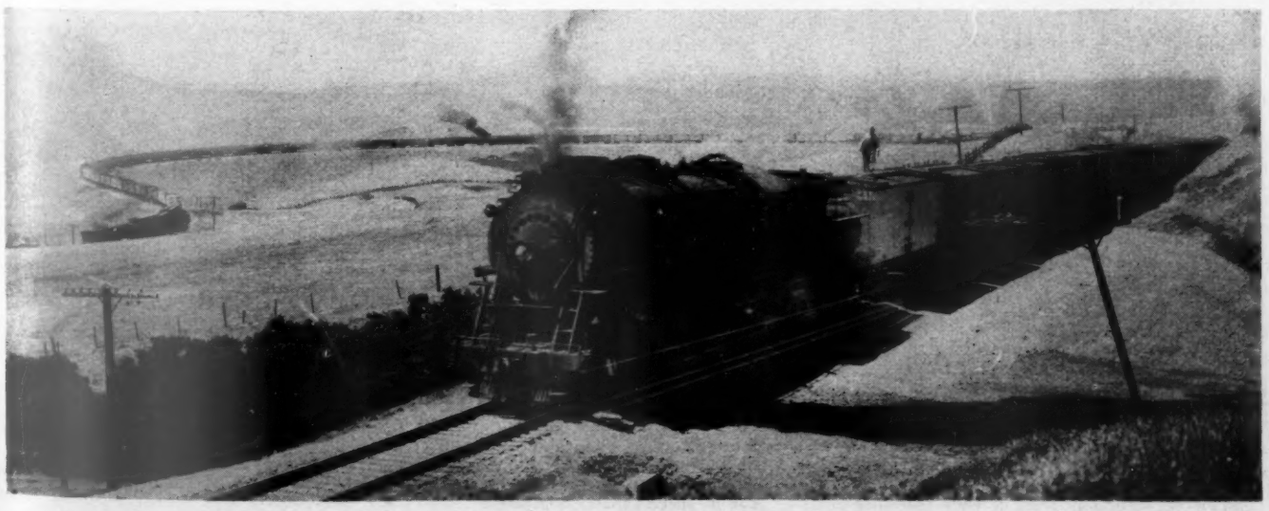


The Spee-D filler neck with knurled pin and hardened wearing surfaces

Machine & Stamping Works, New Orleans, La. To avoid loss of the pin in this fitting, a hardened knurled pin is now forced into position in the fitting under high pressure. This operation embeds the knurled portion of the pin into the surrounding metal and holds the pin securely in the fitting. The application of the knurled pin has been adopted as standard on all of these filler necks.

Another improvement, also adopted as standard, is the hardening of the wearing surfaces of the filler neck. Both of these improvements are indicated on the accompanying cross-sectional diagram.

* * *



NEW SHOP TOOLS AND EQUIPMENT

Hydraulic Two-Speed Journal Jack

The Buda Company, Harvey, Ill., announces the manufacture of a new model 25H10 hydraulic two-speed journal jack. As shown in the illustration, this is a compact hydraulic jack for work where raising and lowering operations must be under complete control at all times. It is designed to be dependable and adaptable for working in limited spaces and has a number of characteristics which make it especially useful for removing railroad car journal bearings. For this sort of work,

Buda Model 25H10 hydraulic two-speed car journal jack in raised position

the jack is said to be unusually fast, doing the job in about one-half the time required with other types of jacks.

This jack has a capacity of 25 tons but is designed to carry 55 per cent overload safely. It has a rise of 6 in., an overall height in the down position of 10 in., and weighs 45 lb. The principal advantages claimed for this jack include: Hydraulic operation, assuring complete control of the load at all times; two speeds, fast speed for medium and light loads and second speed for heavy loads; positive stop and a limited rise, with no chance for the ram to bind in the cylinder at the top position; rugged construction with a ram made of solid bar stock and base of high-strength malleable iron; safety and ease of operation with a swivel handle to assure ease in carrying; practically no maintenance, as there are only two places for adjustments or cleaning out; use of a solid casting without blind plugs to present a possibility of oil leaks.

Speed-Variator Equipment

Complete speed-variator equipment operating from an alternate-current source of supply and furnishing wide ranges of adjustable speed by means of the well-known generator-voltage-control scheme has been announced recently by the General Electric Company, Schenectady, N. Y. Each equipment consists of an adjustable-speed, direct-current motor, an adjustable-voltage motor-generator set with control, and a separately mounted generator-field rheostat. Standard speed ranges are available up to 16:1 ratio.

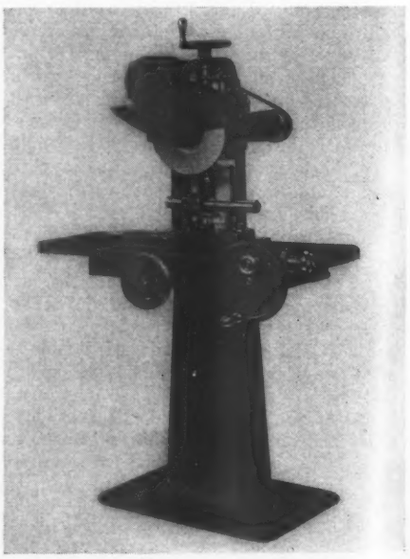
The motor can be mounted directly on the driven machine, with the speed-changing control mounted nearby. The units are designed to operate from 3-phase, 60-cycle, 220-, 440- and 550-volt alternating-current power. The generator-field rheostat of the potentiometer type provides speed changes in small increments over wide ranges.

The speed variator is suitable for many industrial applications where adjustable speed has a direct bearing on the control of quality and efficient output of the driven machine. This flexible power medium is applicable to material-handling operations throughout the whole industrial field. Machine tools, pumps, fans and printing machines are natural applications. Heavy starting duty and slow threading speed, quick stopping and fast acceleration, coupled with flexible control, are some of the major features of this equipment.

General Electric motor-generator set for use as part of speed-variator equipment

Single-Purpose Chaser Grinder

While the Geometric Tool Company, New Haven, Conn., builds several types of grinding fixtures which may be mounted on most universal surface grinders, there has been a demand for a single-purpose chaser grinding machine. The No. 20 chaser grinder has just been developed with one purpose in view, the accurate re-sharpening of chasers. This machine has a longitudinal travel of 8 in. with a working surface 4 in. by 19 in. It occupies a floor space of 44 in. by 32 in. and is



The No. 20 Geometric chaser grinder is designed to accurately resharpen die-head and tap chasers

equipped with a one-third horsepower motor with a V-belt drive.

The work table is mounted directly on a plane, ground surface and may be fed manually both longitudinally and transversely. The spindle housing is mounted pivotally on a saddle equipped with three ground ways. The saddle may be adjusted vertically by means of an elevating hand wheel. After adjustment, the saddle can be securely locked in position against the ways. Final vertical adjustment of the grinding wheel is made by means of a small micrometer hand wheel.

The weight of the driving motor in combination with the pivotal spindle mount prevents any back lash from developing in the micrometer spindle adjustment. The

spindle itself is equipped with a tapered bronze bearing at the front and a radial ball bearing at the rear. Adjustment for wear can be made easily by tightening an adjusting nut at the forward end of the spindle. If desired, the machine can be equipped with an exhaust hood.

Welder Designed for Multiple Operation

The P & H Hansen square-frame welder is a machine that measures less than 33 in. in length and one foot in height but delivers uniform welding currents, ranging from 200 down to 15 amperes. The current selection is simplified by a single control on the welder. Once the current setting has been made, the generator automatically responds with the desired arc length under all welding conditions. Missynchronization of open circuit and arc voltage is impossible because of the automatic volt-ampere regulation, self-excitation, and internal stabilization of this machine.

The square-frame design permits a better arrangement of the welder's component parts, gives it an over-all compactness and allows for the convenient stacking of the units for multiple operation. A paralleling arrangement by which the capacities of two or more of these welders may be combined has been developed specially for this welder. With this parallel hook-up an operator has at his disposal for peak loads the aggregate current of two or more machines. When the connection is cut, each machine can be used separately by individual operators.

The single current-control feature is retained for the combined units. The selector of each machine is connected to that of the next machine in series by means of a multiple shifter which, when set for a given current, automatically sets the connecting machines at that amperage. Thus, for a current of 375 amperes using three machines, the multiple shifter is set at 125 amperes which sets all the machines for that output and producing a combined resultant current of 375 amperes. When the welders are operated as individual units, a swing nut on the connecting rod of the multiple shifter is loosened and the rod is disconnected, enabling separate settings to be made on each machine.

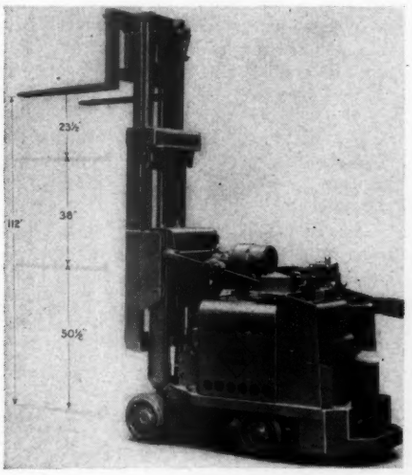
Single or multiple units are available for stationary or portable mountings. This welder is manufactured by the Harnischfeger Corporation, Milwaukee, Wis.

The capacities of two or more P&H-Hansen WD-150 welders may be combined by a simple paralleling arrangement—Two of these machines are shown above ready for parallel operation

Triple-Lift Fork Truck

The Elwell-Parker Electric Co., Cleveland, Ohio, has brought out a fork truck, ERS-3T, capable of elevating loads on skids or pallets to three levels instead of one.

The elevating mechanism is built in three telescoping sections. When the uprights are completely lowered, the forks just clear the floor. Under the operator's control, the forks can be raised to 50½ in. on the first lift, 88½ in. on the second, and 112 in. on the third. The rate of upward travel is 20 ft. per min. with a 1,500-pound load. With the telescoping members lowered, the over-all height of the truck is but 74 in. Thus, the loaded truck can pass through doorways or beneath low overhanging pipes or conveyor systems.



The Elwell-Parker triple-lift fork truck is capable of elevating loads to any one of the three levels indicated

The truck has an Elwell-Parker 4-pole, main driving motor, series-wound, and capable of sustaining a 500 per cent overload. It is direct connected to a free-coasting worm and gear and drives the two wheels nearest the load, assuring ample traction. The power source can be furnished by either acid or alkaline storage batteries. No fuses are needed to protect the motor. When lowering the load, regenerated power is returned to the battery.

The hoist is operated by a separate motor controlled by a push-button. It may be tilted 15 deg. backward or 5 deg. forward from vertical. The two hoist chains have a safety factor of nine and either will handle the load. Vertical uprights and tilt gearing are designed to prevent sidesway.

The hoist has a ratchet device that operates when the descending load meets with an obstruction. A slip clutch serves the same purpose when ascending loads are obstructed. A solenoid brake locks the hoist load in any position. The form arms of the truck are supplied in a variety of dimensions to suit application.

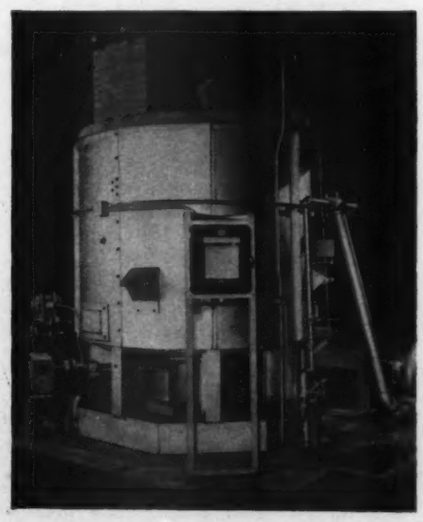
The two wheels farthest from the load are steered by a handwheel. Drive wheels are 15 in. in diameter and 5 in. wide, the trail wheels are the same diameter, 3½ in. wide.

Heat-Treating and Forging Furnace

A center-fired rotary furnace for forging and heat treating work has been developed and patented by the Mahr Manufacturing Co., Minneapolis, Minn. Its primary feature is its single-burner center-firing principle. This burner, located at the bottom of the hearth, fires up through a long combustion cone of special design. This cone insures that the products of combustion come into equilibrium with themselves before coming into contact with the steel, thereby minimizing scale formation and decarburization.

A furnace free from cold spots, even at the furnace door where a cold spot usually exists, is obtained by employing the center-firing principle. The single burner feature assures uniform control over the furnace atmosphere. Positive pressure within the furnace is maintained by an automatic Vent-O-Matic stack damper.

The rotary table is gear driven from a variable-speed transmission. The furnace is equipped with an improved type of sand seal having filling chambers for maintaining the depth of the seal. A special door, equipped with an air curtain, protects the operator from the heat. Automatic temperature controls, as well as an individual low-pressure blower for making it a self contained unit, can be installed. These



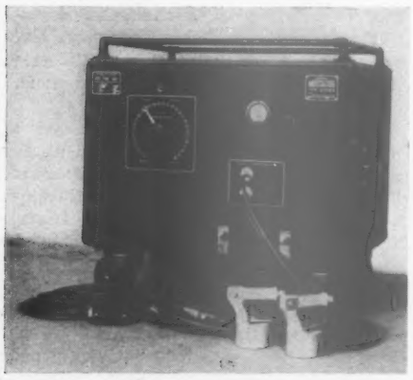
The Mahr center-fired rotary furnace

furnaces are manufactured in hearth diameters from 4 ft. to 9 ft., operating on either gas or oil and producing temperatures from 1,400 to 2,500 deg. F.

Portable Inspection Equipment

The illustration shows newly redesigned portable Magnaflux equipment constructed especially for the railroad field, and widely used in the inspection of railroad parts. It is operated by alternating current capable of delivering a maximum of 3,000 amp. at low voltage, and is equipped with two magnetic leech contacts for use in the inspection of welds, forgings, boiler shells, etc., by the direct-contact method.

A 30-point dial switch is available for control of the magnetizing current and for demagnetizing purposes. This switch is now constructed for the semi-automatic demagnetizing of parts. The frame is of heavy welded angle-iron construction with perforated, removable, side and back panels, and with a rail around the solid-steel top for the convenient storage of cables and accessories. The cabinet is mounted on heavy ball-bearing casters with wide tread wheels. The total weight of the unit is approximately 600 lb. The unit is made by the Magnaflux Corporation, Chicago.



Portable Magnaflux equipment for railroad service

Tractor Crane with Pneumatic Tires

The Krane Kar, an industrial tractor crane, is now available with heavy-duty dual pneumatic tires for the traction wheels and single pneumatic tires for the steering wheels. Solid cushion rubber tires have been standard equipment in the past and for most uses they have been satisfactory. However, there are service conditions that make pneumatic tires desirable, particularly those in which this tractor crane encounters adverse road surfaces. These tires will furnish better traction and improve the riding qualities over soft roads, cobblestone roads and railroad tracks.

Krane Kar equipped with pneumatic tires

The pneumatic tires will be equipped with standard heavy-duty inner tubes, although puncture-proof inner tubes are obtainable as extra equipment. An auxiliary power air pump will be installed as part of the tractor crane's equipment for those who do not have conventional garage facilities.

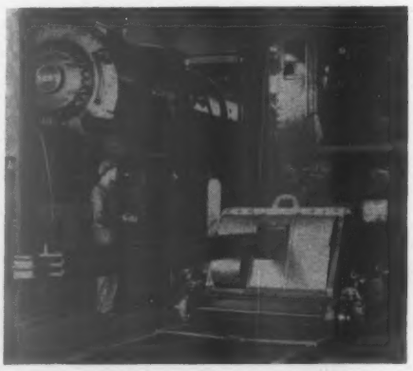
On work in which the tractor crane is operated a substantial portion of the time in reverse gear, a directional transmission is available that produces four speeds in forward and four in reverse gear in place of the standard transmission with four speeds forward and one reverse. Allied equipment, such as electric magnets and clam-shell buckets, and telescopic booms as well as booms of greater length are also available.

The Krane Kar is obtainable in three sizes, Model A has a lifting and transporting capacity of 5,000 lb., Model AX 10,000 lb., and Model AY 20,000 lb. It is made by the Silent Hoist Winch & Crane Company, Brooklyn, N. Y.

Spotter Connects Tender to Locomotive

The Model E spotter made by the Whiting Corporation, Harvey, Ill., has a capacity of 45,000 lb., push or pull, which is 50 per cent greater than the power possessed by the older machines. This increase in capacity was furnished in order that the spotter could be used to connect tenders to locomotives after draw-bar examinations. In addition, it serves for any locomotive spotting operation and to reduce valve setting costs.

The machine has a beam of sufficient length to produce a complete revolution of the largest pair of driving wheels used on our American railroads. One end of the beam is equipped with a coupling eye and the other end with a coupler. The spotter, roller-bearing equipped, is pushed to a designated position by hand, locked into place. After being coupled it can move the heaviest locomotives through push-button control. It can also spot these locomotives "on a dime."



The Whiting Model E spotter has sufficient capacity to connect the tender to the locomotive

Self-Contained Portable Arc Welder

The all-purpose a.c. FlexArc welder, designed for general utility service and production welding of every type, has just been announced by the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa. The standard models of this welder are self-contained and operate on either 220 or 440 volts.

Westinghouse a.c. Flex-Arc welder

Current adjustment is easy, as it is only necessary to select the current desired and insert the bayonet plugs in the proper receptacles on the side of the welder. From 20 to 250 amperes of welding current is available in 27 steps with the increments properly proportioned to meet the needs of welding with a wide variety of electrode types and diameters. The current values are indicated in large numerals on the case.

A built-in De-Ion breaker insures protection against long sustained overloads such as might occur by accidentally leaving the machine short circuited. This breaker is also convenient for disconnecting the machine from the line without having to go back to a service or feeder switch. The open circuit or striking voltage is exceptionally low, being on the order of 80 volts at 20 amperes and ranging down to 50 volts at the highest current rating.

The welder is self-contained and portable, being enclosed in a steel case and mounted on three wheels. High efficiency,

high power factor and low no-load losses insure maximum operating economies.

Miller Features Maneuverability

Large bed-type milling machines, known as horizontal Hydro-Tel, have recently been announced by the Cincinnati Milling Machine Co., Cincinnati, Ohio. They are different from conventional heavy-duty bed-type millers, inasmuch as they have a high degree of maneuverability, even greater than the majority of knee-and-column-type milling machines.

The hydraulic table traverse and the spindle carrier traverse, actuated by Servo control mechanisms, are the reason for the extreme ease of operation. An effort of about one pound on the table traverse hand-wheel controls the hand feed of the table, a Meehanite iron casting which weighs approximately 4,000 to 6,500 pounds, depending on the size of the machine. Even though the table is loaded with an equal weight of fixtures and work, it requires no more effort to move it by hand. Likewise, the vertical movement of the spindle carrier by hand requires about a one-pound force on the handwheel.

All controls are closely grouped in a central and convenient location on the spindle carrier and at the rear of the bed, the position of greatest visibility for the operator to stand while working. With very little effort, the operator has complete accessibility and control of all setting up and operating levers.

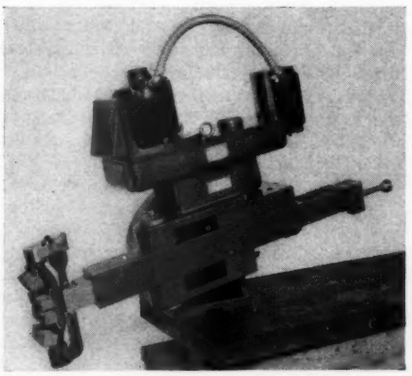
Important features include independent and non-related feeds for the table and vertical movement of the spindle carrier. Each unit has feed rates of 1 in. to 25 in. per min., infinitely variable, and rapid traverse rates of 120 in. per min. The hydraulic circuit firmly positions the spindle carrier while the table feed is engaged and vice versa. There are 16 spindle feeds on a large dial at the side of the spindle carrier. The entire machine is automatically lubricated with filtered oil. The front bed provides a full-length support for the table, except for a slight overhang at the extreme end of the travel.

While this machine tool is primarily a general purpose miller, it is also well adapted for the milling of large dies, as shown in the illustration.

The Cincinnati horizontal Hydro-Tel milling machine is shown milling large dies

Superfinishing Heads For Engine Lathes

The new Foster Superfinishing heads are made in four sizes that are adaptable for almost any diameter of cylindrical work. The larger size of the inclined pivot-arm type, illustrated, has been used to Superfinish locomotive piston rods and car axle journals.



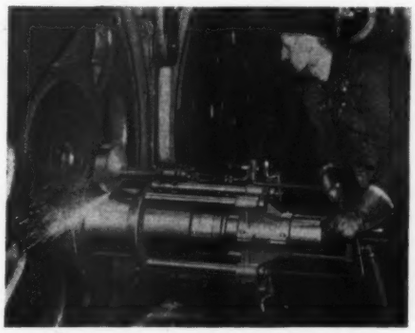
The Foster inclined pivot-arm type of superfinishing head may be attached to engine lathes

A common method of refinishing axle journals is by rolling them after they have been turned. The resulting finish, however, is wavy and characterized by high spots. By performing an extremely short Superfinishing operation, these high spots may be removed and a surface more geometrical in shape produced, making possible the more even distribution of the oil film. Therefore, the possibility of oil-film fractures and metal-to-metal contact is reduced and many hot boxes may be eliminated. While the actual micro-inch reading of the finished piece depends upon the previous machining operations, surfaces of two to four micro-inches (one micro-inch equals one-millionth of an inch) are easily obtainable.

These heads may be attached to engine lathes or any special lathes. The oscillating movement of the stones is sideways and is transmitted through a pivoted mounting of the arm. Stone retraction is obtained by a lever at the end of the arm. The stone pressure is spring regulated and stone holders may be changed quickly for different jobs. These heads are a product of the Foster Machine Company, Elkhart, Ind.

Portable Locomotive Crank-Pin Grinder

The Milwaukee crank-pin grinder will grind all types and sizes of crank pins without removing the wheels or guides from the locomotive. If a crank pin is worn out of quarter and stroke, this unit will remove high spots and correct these conditions if the pin was originally in the correct quarter and stroke. Worn or cut trailer- and car-truck journals, holes in the back end of main rods and similar jobs may also be reconditioned by this grinder. It is available with either an air- or electric-motor drive.

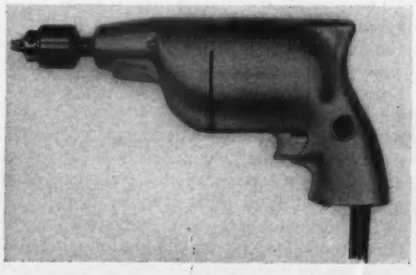


The portable Milwaukee crank-pin grinder in operation

The equipment is furnished with two grinding wheels operated independently by two motors. The depth of feed is controlled separately by a hand crank. A polishing wheel is used to finish the crank pin to any desired smoothness. The grinder is applied to the crank pin by the use of centering adapters which may be made up by the railroad to suit their own requirements. This equipment is made by the Goetz-Voss Corporation, Milwaukee, Wis., and the sales representative is the U. S. Metallic Packing Co., Philadelphia, Pa.

High-Speed Electric Tapper

The Tapgun was designed to meet the demand for a light-weight unit to handle portable tapping operation in small sizes on assembly jobs. It is equipped with a universal motor operating on either a.c. or d.c. current. A feature of this tool is



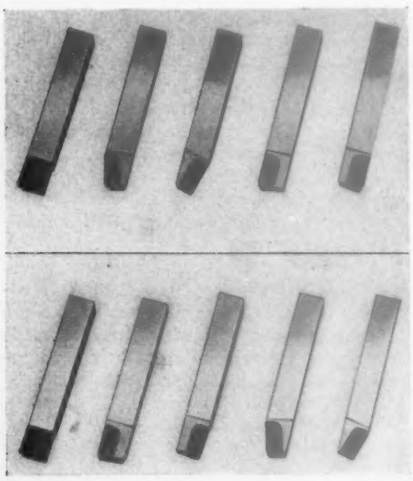
The Black & Decker No. 8 Tapgun

the automatic reversing mechanism which engages an idler gear when the operator pulls backward on the unit and automatically backs the tap out of the threaded hole at high speed. No reversing switch is needed.

The Tapgun weighs 3¾ lb. and measures 9¼ in. in over-all length. It taps up to 5/16 in. in cast iron, 3/16 in. in steel, and 3/8 in. in brass or aluminum. It taps at 400 r.p.m. and backs out at 525 r.p.m. This equipment is made by Black & Decker Mfg. Co., Towson, Md.

Carboloy Cutting Tools Standardized

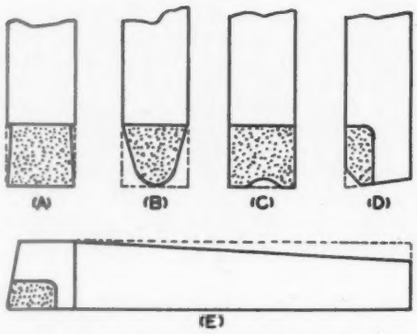
The manufacture on a mass-production basis of a new line of cemented-carbide-tipped cutting tools introduced by Carboloy Company, Inc., Detroit, Mich., is intended to make it economically possible to decrease the amount of brazing and grinding now done by organizations who now purchase Carboloy tips to produce their own tools. This line covers in five standard styles and three grades the majority of all turning, boring, and facing applications. In addition, the new standard tools are also capable of simple conversion by the purchaser into hundreds of forms of special tools.



Carboloy standard tool line—Above: Steel-cutting tools with copper-colored shanks—Below: Aluminum color distinguishes tools for machining cast iron

One of the illustrations shows two complete sets of tools, one for cast iron and one for steel, in one of the seven sizes in which these standard tools are available. Differentiation between tools designed for steel cutting and those intended for the machining of cast iron is furnished by the color of the tool shank. Those for steel are copper colored and those for cast iron are finished in aluminum color.

The introduction of a standard line of these tools for the machining of steel has been facilitated through the development of a general-purpose grade for steel cutting. Tools made of this grade, 78B, will stand more abuse than those of the 78 grade, while they also have greater resistance to abrasion than the 78A grade. They are designed to take cuts up to ½ in. deep and feeds up to .030 in. For the machining of cast iron the standard tools are available in two optional grades.



Special tool forms may be produced by simple grinding operations on Carboloy standard tools

In the accompanying diagram are shown typical examples of special tools which may be produced from the standard tools through simple grinding operation. The dotted lines indicate the original shapes of the tools. Tools *A* and *B* are grooving tools, the first for square grooves, and the other for form grooves such as are used in pulleys. Tool *C* is another type of forming tool. All three of these are derived from style No. 1. Tool *D* shows how a style No. 7 tool can be converted quickly into a chamfering tool, while at *E* a facing tool has been produced from tool style No. 4 by grinding back the shank. Engineering studies at Carboloy indicate that well over 200 forms of tools formerly purchased as special may be produced from style No. 4 alone.

Direct-Current Arc Welder

The General Electric Company, Schenectady, N. Y., has announced a new 200-amp., d.c. arc welder which will produce any welding current from 25 to 250 amp. This wide range allows all-day manual welding to be done with currents up to 200 amp., using electrodes from 1/16 to 5/16 in. in diameter. Its capacity is sufficient for the use of electrodes as large as ¼ in. on occasional short jobs.

General Electric single-operator d.c. arc welder

The arc welder has two outstanding features. First, it provides for instant recovery of the voltage to an extent greater than the arc voltage after each short circuit, thus preventing time-wasting arc pop-outs. Second, it never allows current peaks to exceed three times the steady short-circuit current on any adjustment, thus preventing excessive heat and spatter and resulting in a saving of electrodes. Both of these features are made possible by a split-pole cross-field design.

Other advantages include excellent commutation, isothermic overload protection for the motor, self excitation, which does away with the necessity for an extra generating unit; quick adjustment of welding current, and horizontal mounting. Self-sealed ball bearings are used. An improved, highly efficient ventilating system prevents overheating even when the welder is operated within the proper range for long periods. A full range of current adjustment is obtained without the use of a current resistor. This results in a saving of 10 to 15 per cent of the power costs.

Versatile Wood-Working Machine

The DeWalt Type GE woodworking machine is capable of a variety of operations limited only by the ingenuity of the operator. It will cross cut, miter, rip, bevel cross cut, compound miter and bevel rip, using a combination saw blade. With the addition of dado heads, shaping cutters and other tools it will perform numerous other operations.

The DeWalt Type GE woodworking machine—The phantom views show some of the positions in which the arm and motor unit may be placed

This unit consists of a working table on which is mounted a column that can be elevated or lowered. The column supports a uniform cantilever arm which can be swung 360 deg. around the column. Riding on machine tracks, inside the arm, on sealed self-aligning ball bearings, is a carriage which suspends a yoke capable of being revolved 360 deg. horizontally. This yoke supports the motor or power unit to which all cutting tools are directly attached and this unit may be revolved 360 deg. vertically. The machine can be powered with motors from ½ to 25 hp. This selection of motors makes it possible for the machine to cut material from 1 in. to

16 in. in thickness and cross cut material up to 33 in. in width.

The 1941 models feature an improved design in construction. They have cast nickel-molybdenum semi-steel machine frames, new shielded ball-bearing roller carriages, and tapered keys with mechanical adjustment which enable the operator to maintain the accuracy of the machine throughout its entire life. Another improvement has been made in the motor which is totally enclosed, fan cooled, of the 40 deg. continuous duty type. This motor features grease-sealed bearings which make lubrication unnecessary and is insulated with Fiberglas. This machine is manufactured by the DeWalt Products Corporation, Lancaster, Pa.

Hydraulic Piston-Rod Parter

The Sperry piston-rod parter is essentially a high-capacity hydraulic jack specially designed to fit into locomotive crossheads for the purpose of pressing out piston rods. The fit between crosshead and piston rod is quickly and easily broken without damage to these two important elements of the locomotive machinery. It is designed for portable mounting and convenient one-man operation. All component parts are made of a special steel alloy, heat treated to withstand extreme hydraulic pressure.

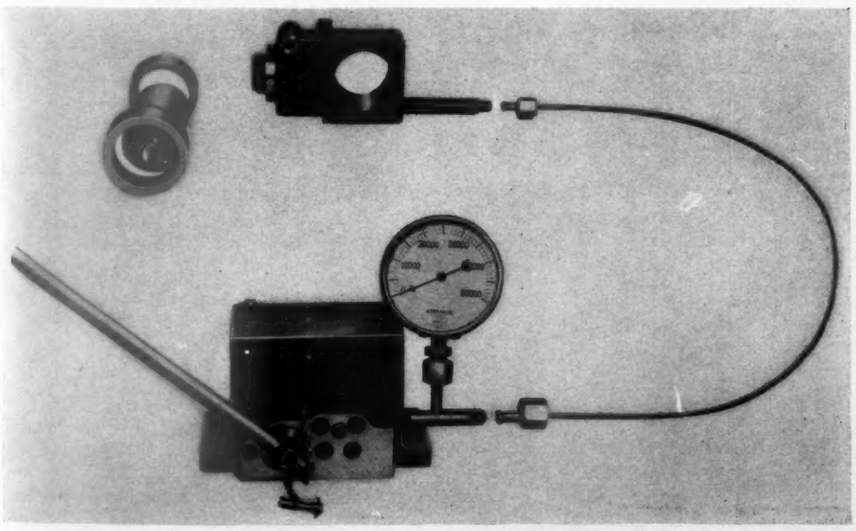
Two hydraulic jacks are available for use with this device. One is designed for use in crossheads with a width of four to five inches between the cheeks. This jack actually measures $3\frac{15}{16}$ in. in width, produces a maximum total parting force of 150 tons and weighs 33 lb. The other jack fits crossheads with 5 in. or more between the cheeks. It measures $4\frac{15}{16}$ in. in width, develops a total parting force of 250 tons, and weighs 51 lb. The pump used to operate either of the two jacks is capable of delivering 35,000 lb. per sq. in. and weighs 65 lb.

The piston rod parter in operation—The portable mounting facilitates handling

In operation, adapter bushings are first installed in the crosshead wrist-pin holes. These bushings are made up according to crosshead drawings and tapered to fit the holes. The correct size of jack is then placed in the crosshead and held firmly in position by the dummy wrist pin which passes through the jack and is supported on each end within an adapter bushing. The hydraulic force required to press out the piston rods is supplied by the pump which is connected to the jack by a heavy-wall steel connection tube. Only a few strokes on the pump handle are required to break the tightest piston-rod fit. This force has its reaction taken up over that section of the crosshead designed to take the connecting-rod thrust. There is no impact. The stress is slowly and evenly distributed on both sides of the crosshead, eliminating any possible distortion of the wrist-pin holes. The hardened-steel ram insert is aligned flush against the end of the piston rod protecting the lathe center hole against possible damage.

After a piston rod has been pressed out, the jack is removed from the crosshead and the ram returned to its cylinder by means of a wrench inserted in the end of a retracting pinion. The oil, thus being forced out of the cylinder, is returned to the reservoir through a by-pass valve which has been opened for this purpose. When the by-pass valve is again closed, the piston rod parter is ready for another operation.

The portable arrangement, shown in one of the illustrations, has been found to facilitate the efficient handling of the piston-rod parter in moving it from one location to another. This device is made by Sperry Products, Inc., Hoboken, N. J.



The Sperry piston-rod parter showing dummy wrist pin with adapter bushings and the hydraulic jack with connections to the operating pump

Bending Press with All-Welded Frame

The Model J-12 Steelweld bending press, illustrated, is one of a line of presses with one-piece all-welded frames made by the Cleveland Crane & Engineering Co., Wickliffe, Ohio. This press will handle up to $\frac{5}{16}$-in. by 12-ft. plate between the housings and plate 14 ft. long over the total length of the bed and ram. Longer plate can be handled by extending the bed and ram either on one or both ends. The J-12 has a double end extension and a one-piece all-welded frame that will remain rigid for the life of the machine.

The Model J-12 Steelweld bending press

The ram is operated by two eccentrics, one on each side of the machine. Each eccentric is supported by three extra large main bearings and an eccentric bearing. The bearings are lubricated automatically by two oiling units mounted at each end of the press. All gears are protected with metal covers and the shafts are located at the rear of the machine away from possible damage by crane hooks or bent-up plates.

The press may be used for bending, forming, blanking, drawing, rubber-forming and multiple-punching operations. Several operations may be performed by passing the work successively through various dies set in position along the length of the

machine. Its approximate over-all dimensions are: 15 ft. 6 in. long, 7 ft. 4 in. deep, and 11 ft. high. It has the usual 18-in. throat which is standard for all Steelwelds.

Respirator Filter Cartridge

The American Optical Co., Southbridge, Mass., announces another new filter cartridge for its R-1000 respirator, thereby providing five interchangeable types of protection in one basic respirator. The new filter gives comfortable protection against toxic dusts formed by crushing,

A filter cartridge for toxic dusts has been developed by the American Optical Company for its R-1000 respirator

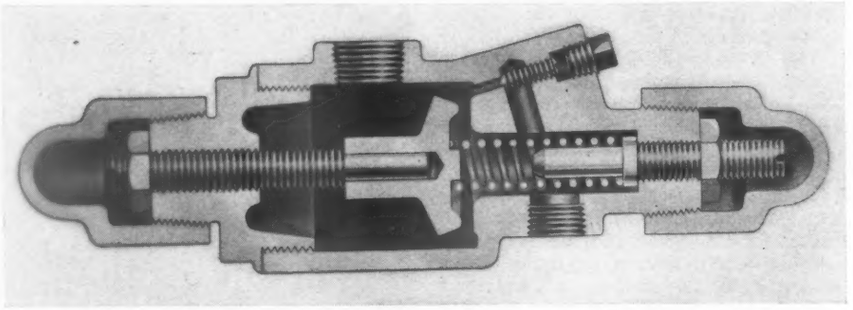
grinding or abrading such solids as lead, cadmium, arsenic, chromium, manganese, selenium, vanadium and their compounds.

The other four filter cartridges previously developed by this company give protection against: (1) Pneumoconiosis-producing dusts like quartz, asbestos, ores, coal, flour, etc.; (2) low concentrations of fumes, vapors or gases encountered in paint spraying, and other light organic vapors; (3) low concentrations of acid fumes and gases; (4) low concentrations of combined acid-organic gases and vapors.

Automatic Shut-Off Valve

If a flexible hose conveying compressed air, steam, gas, or fluid breaks or becomes disconnected by accident or through faulty connections, it whips around in a dangerous manner. With the Murray-Lorge automatic shut-off valve placed in the supply line above the flexible hose, the air, steam, or other fluid supply is automatically shut off by this valve immediately upon the hose breaking or becoming disconnected. When repairs or connections are made the valve automatically re-opens.

The use of this valve permits tools to be changed without shutting off the supply of compressed air or steam. When the workman connects up a different tool, the valve re-opens automatically upon the pressure in the flexible hose becoming equalized with the pressure at the valve inlet.



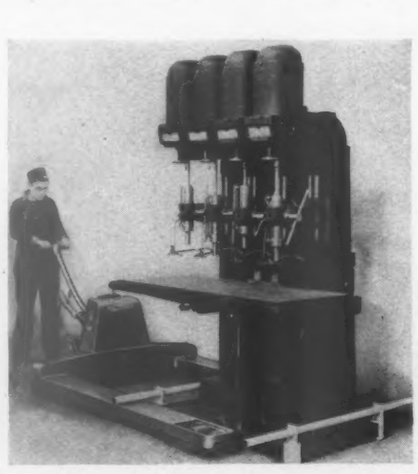
Cut-away view of the Murray-Lorge automatic safety shut-off valve

The integral parts of the valve are shown in the illustration. As long as the pressure at the inlet and outlet are nearly the same, the plunger is maintained in an open position by means of a spring, permitting the air or steam to flow around the plunger in a normal manner. When the outlet is left wide open, the plunger slides tightly against the valve seat shutting off the flow from above the plunger. The valve plunger may be adjusted to shut off the flow of air or steam automatically at any desired pressure at the inlet or size of break at or below the outlet.

This valve is a safety appliance designed by the D. J. Murray Mfg. Co., Wausau, Wis.

Lift Truck Handles Machine Tools

An open-end hydraulic lift truck designed especially for machine tools has been developed by the Lewis-Shephard Sales Corp., Watertown, Mass. With this adaptation of the lifting platform, cumbersome machine tools with a large variety of base sizes may be handled by this truck. The demountable clamps on the drill press, shown in the illustration, painted white, are the manufacturer's own device. Other types of clamps or eye-bolts may be used as effectively.



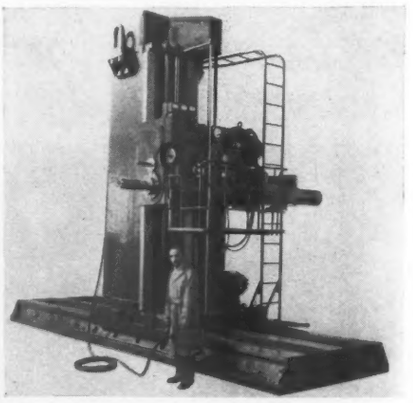
Lewis-Shepherd open-end hydraulic lift truck of 6,000-lb. capacity handling a drill press

The truck has hydraulic-foot-lift elevation, a platform length of 78 in. and an over-all width of 60 in. It is equipped with rubber tires and a trailer hitch that permits tractors or power trucks to haul this truck with its load. The trucks are obtainable in capacities from 3,500 to 15,000 lb. and over.

Boring, Drilling and Milling Machines

The Giddings & Lewis Machine Tool Company, Fond du Lac, Wis., will make available to industry a heavy-duty design of high power, horizontal boring, drilling, and milling machines with the announcement of its 50-series line.

The first machine of this new series to be built was a floor-type machine having a main spindle diameter of 6 in. and an auxiliary spindle diameter of 2½ in. A 96-in. head-stock travel and 192 in. of column travel on the runway were two of the dimensional specifications. The over-all height of the completed machine was approximately 18 ft., while the height of the complete unit was 85,000 lb.



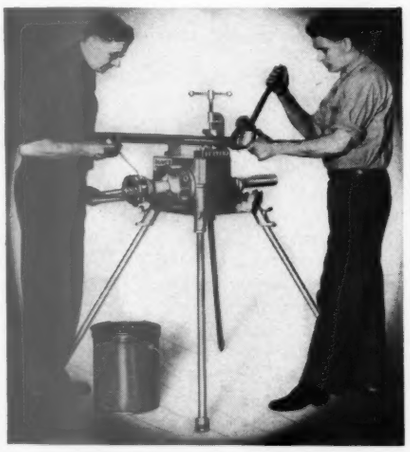
Giddings & Lewis 50-series floor-type machine —It has a portable remote-control station

Among the standard features of the manufacturer's equipment incorporated in this series are the two-spindle design, in-

dependent operation of units, rotary-feed selector, wide range of boring and milling feeds, direct reading dials, automatic depth gage, safety limit switches, scales and adjustable verniers. Particular attention has been given to the design of electrical controls for greater flexibility and ease of operation. A portable or remote control station in addition to the regular control station located on the operator's platform is furnished as shown on the accompanying illustration. The 50-series will be available in table, floor and planer types with working ranges to meet specific requirements.

Portable Threading Machine

Model-C is the designation for a new portable threading machine produced by Beaver Pipe Tools, Inc., Warren, Ohio. It has a motor-driven chuck of sufficient capacity



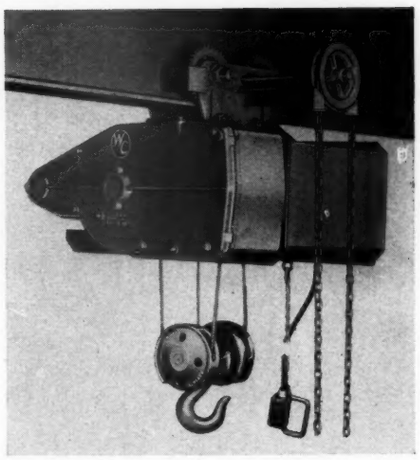
The Beaver Model-C portable threading machine

to thread 2-in. pipe with full-width solid dies or to act as the driving unit for geared pipe-cutting heads to 8 in. capacity. The machine can be supplied as a single unit or with a vise and bending head as shown in the illustration.

The driving motor is a Black & Decker unit rated at ½ hp. and available for operation on 110 or 220 volts, ac. or dc. A reversing switch is part of the equipment. The chuck is a standard design and will grip pipe from ⅛ in. to 2 in. in size. At the side of the housing is an extension bar lying parallel with the axis through the chuck to act as a back stop for the handle of a threading tool.

Electric Hoist for General Shop Service

The electric hoist shown in the illustration is one of a line of motor-operated hoists with push-button control built by the Whiting Corporation, Harvey, Ill. These hoists



Whiting type WFBG electric hoist with push-button control and chain-operated geared trolley

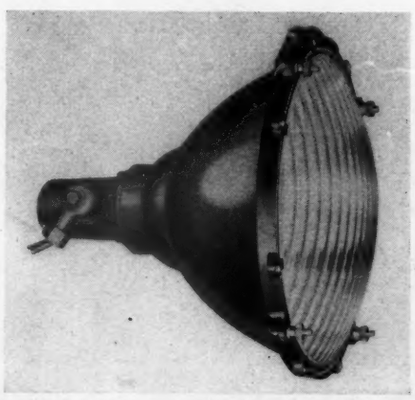
have a welded all-steel frame to which is bolted a cast gear case containing the reduction gearing and the load brake. The frame is furnished with a built-in steel trolley or with lugs or hooks for suspension, or it may be designed for floor mounting.

The trolley may be plain or geared and the geared trolley may be furnished with either a chain or motor drive. Low headroom is obtained in these hoists by mounting the drum parallel with the track and allowing the hook block to come up along side of the drum. This construction prevents any unbalancing when reaching for loads since the pull is always tangent to the drum.

These electric hoists are available with capacities ranging from 1,000 to 15,000 lb. and lifts of from 20 to 40 ft. The manufacturer also builds models having a pendent rope control.

Lighting Unit Resists Corrosion

To meet the need for a local floodlighting unit able to withstand severe vibration and



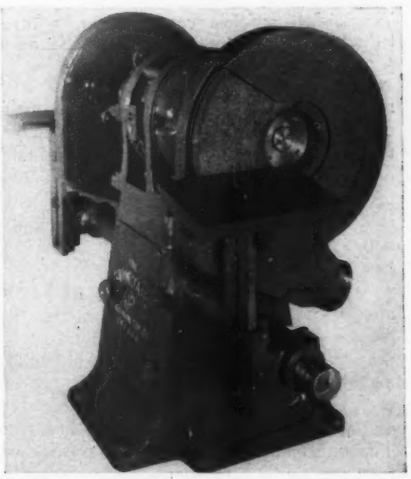
Westinghouse Tufflite Concentrators withstand vibration and corrosive atmospheric vapors

resist deterioration from corrosive atmospheric vapors, the Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has developed the Tufflite Concentrator, a unit using either a 300- or 500-watt PS-40 Mazda lamp. These concentrators are of particular value in railroad enginehouses.

The complete unit consists of a copper housing, inner Alzak aluminum reflector, cast bronze socket-housing assembly, swivel for ¾-in. conduit mounting, and a glass-cover door assembly. All hardware is bronze or copper, nickel plated. The heat-resistant glass spread lens is held securely in place against a graphitized asbestos gasket by eight bronze spring clips fastened with machine screws.

Double-End Disc Grinder

The double-end disc grinder shown in the illustration is a new item in the line of equipment made by the Standard Electrical Tool Co., Cincinnati, Ohio. It is mounted on a cast-iron pedestal and has a



The five-horsepower Standard double-end disc grinder with 18-in. diameter discs

direct motor drive. Located inside the base is a magnetic starter having overload and under-voltage protection with a push-button station installed at the front of the machine convenient to the operator. The grinder is furnished with heavy-duty ball bearings, fully protected by a sight-feed oil gage on each bearing housing in order that the oil level may be easily determined at all times.

A plain swivel table on each side of the machine is supported by a heavy one-piece rocker arm bar extending through both sides of the pedestal. When required, the grinder can be furnished with a universal table on one or both sides. The steel discs are accurately machined and balanced and it is optional for the user to employ steel-back emery discs or to apply the emery discs with glue by use of the disc press. The disc wheels are protected

with an exhaust pipe and fabricated boiler-plate steel guards. The discs are available in sizes from 10 to 30 in. in diameter.

Multiple Cutter Turner

A multiple cutter turner for turret lathes has been announced by the Gisholt Machine Company, Madison, Wis. The cutter turner makes several reducing cuts si-

The Gisholt multiple cutter turner, a turret lathe tool for making several cuts simultaneously

multaneously. Among the design features of this tool which contribute to its ability to make heavy high-speed cuts and still maintain exact dimensions and fine finish are its rigid steel construction, hardened steel rollers mounted on roller bearings, and adjustable roller arms that attach securely to the block.

Set-up operations are facilitated by the micrometer adjustment screws on the tool blocks. All movable parts are adjustable for wear and are enclosed to exclude chips and dirt. This turner is available in several sizes which permit turning diameters as small as ¾ in. and as large as 4¾ in. The multiple cutter turner, illustrated, will turn one to four or more diameters at one time. Individual or multiple tool blocks are available.

Dry-Cutting Cut-Off Machine

The Radiac Type M cut-off machine is being introduced by A. P. DeSano & Son, Inc., Phoenixville, Pa., for dry-cutting only. This machine is of the heavy-duty bench type, using a disc 12 in. in diameter by 1/16, 3/32 or ⅛ in. in thickness. It has a five-horsepower motor with a five Vee-belt drive. It is furnished with two sets of interchangeable wheel flanges, a special angular depth adjustment with a quick-acting locking device, and a special work clamp for holding stock within the capacity of the machine. The vise opens up to a width of 2½ in. between the jaws.

The work is clamped in the vise by means of the spring tensioned jaws. A

The Radiac Type M cut-off machine on a steel base—It may be mounted on a bench

hand lever is used to release the stock quickly. The machine and clamping device are mounted on a steel base. It may also be obtained without the base for mounting on a bench.

Machine for Milling Keyways and Splines

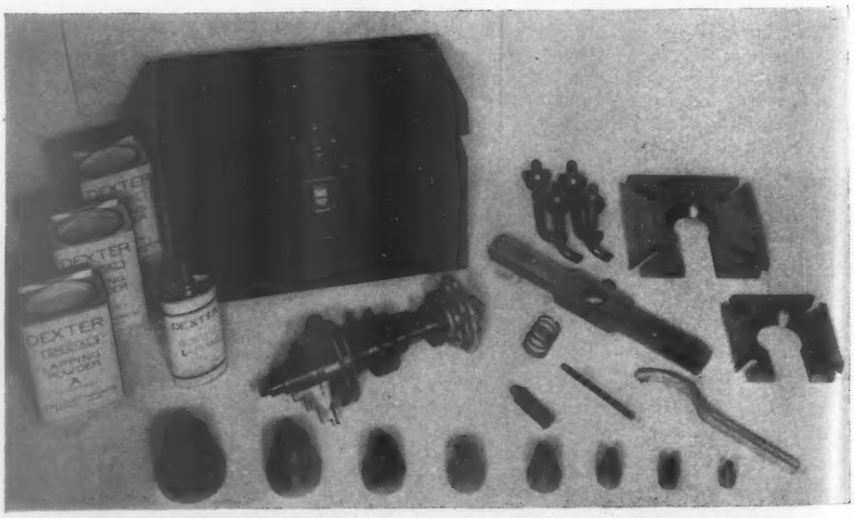
The Sundstrand hydraulic Rigidmil is designed to mill keyways and splines in shafts ranging in size from 2 in. to 10 in. in diameter and up to 10 ft. in length. The keyways range from ½ in. to 2¼ in. in width and are machined to .002-in. limits. On this machine the fixtures can be adjusted easily so that the keyways and splines can be cut to any length on the shaft after the work is placed between the headstock and tailstock. The machine weighs approximately 40,000 pounds. It is built by the Sundstrand Machine Tool Co., Rockford, Ill.

The base member and column are of welded-steel construction. A horizontal head attached to the column ways has a 12-in. vertical adjustment and has a single

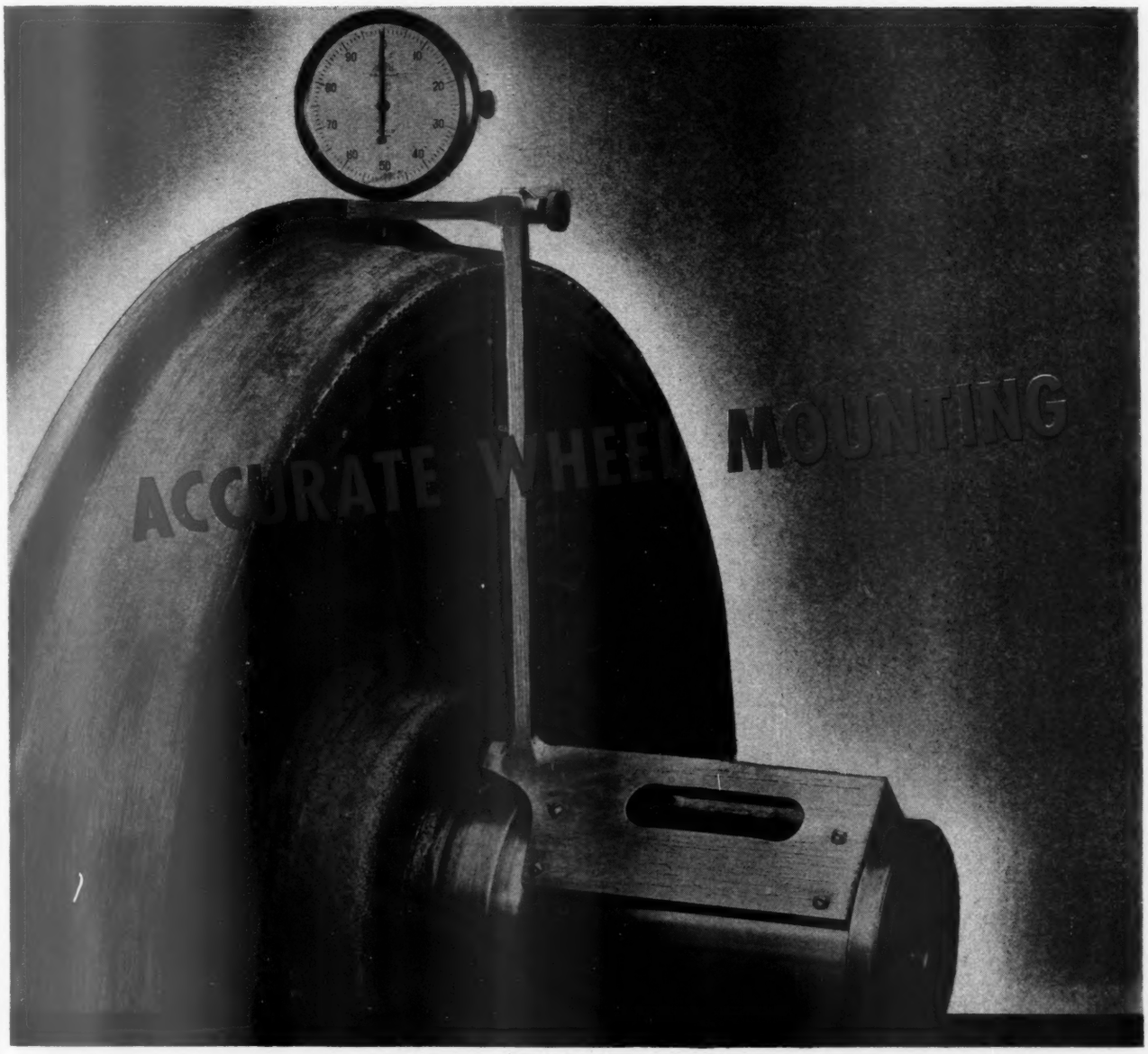
The Sundstrand hydraulic Rigidmil for milling keyways and splines in shafts

spindle that is mounted in a quill with a 3-in. end-wise adjustment. This head also has ways on which the vertical spindle head is mounted, these ways furnishing a crosswise adjustment of 5 in. The vertical spindle is mounted in a quill having a 6-in. vertical adjustment.

The horizontal end is raised and lowered by means of a hand wheel that has a micrometer dial graduated to .001 in. The machine table has a working surface of 22 in. by 186 in. and has a travel of 132 in. in either direction with power feed or rapid traverse. The table is operated hydraulically at speeds of ½ to 10 in. per min. and in rapid traverse at a rate of 85 in. per min.



The Dexter lapping outfit, by using a special yoke and handle, enables the operator to lap globe valves with Stellite seats easily and efficiently—It is made by the Leavitt Machine Company, Orange, Mass.



. . . is as important as accurate wheel making. A perfect wheel, eccentrically mounted, is certain to develop defects. The concentricity gage developed by our Research Laboratory and used by our Association members for all wheel mounting adds one more safeguard to proper assembly and provides a positive check on mounting practise.

You, too, will find this simple device invaluable. We will be glad to send a complete description at your request.

4 Savings with Chilled Car Wheels

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High Spots in
Railway Affairs . . .

Railroad Employment Still Climbing Up

The latest figures for railroad employment when we went to press were for mid-August. According to the Interstate Commerce Commission figures, based on preliminary reports from the carriers, there were 1,050,254 employees at that time. This was 5.4 per cent greater than for August, 1939. The largest increase over a year ago was in the maintenance of equipment and stores group, which was up 9.73 per cent. Next in order was the train and engine service group with an increase of 5.68 per cent. The maintenance of way and structures group showed an increase of 4.91 per cent.

A Railroad Executive Who Knew Machine Tools

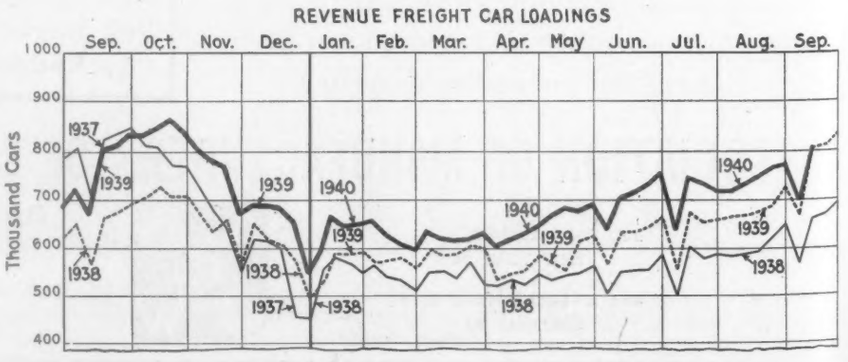
Leonor Fresnel Loree, who passed away on September 6, was one of the most energetic and colorful railroad executives and financiers in this country, or in the world for that matter. Comparatively few people, however, knew of his keen and exceedingly intelligent interest in mechanical department affairs. It was always a fascinating experience to be invited to drop over to his office for a little chat. One never knew quite what to expect when courteously ushered into his commodious office. On one occasion he said he was interested in the rehabilitation of a locomotive repair shop on one of the systems with which he was associated. What could I tell him about the latest and most efficient machine tools and shop equipment? I quickly discovered it must be something we had not described in our columns, for he was thoroughly familiar with what had already been published. And when I say familiar, I mean just that, for he knew pretty well all there was to know about the merits of the particular machine or device. My surprise was even greater when he referred to the early history and development of some of the tools. He proved to be thoroughly at home with the writings of Prof. J. W. Roe in that field. This may not be so strange, however, when we remember that it was Loree who introduced the Newcomen Society into America. That organization is a British Society that has specialized in a study of the beginnings and history of engineering and industry. Made up in England of men more of the antiquarian type, the movement in this country is sponsored by leading industrial, transportation and business executives and engineers, with a generous sprinkling of engineering educators. Interestingly enough, however, one thinks of Loree as more closely resembling the British group, because of the unusual degree to which he pursued and dug up historical facts about the early beginnings of American transportation and industry. He did much to encourage research in and was thoroughly at home in that field. His interest in mechanical department problems, however, was much broader than this.

How Many Pieces in A Car or Locomotive?

Mr. Loree had a keen conception of the necessity for and possibilities of reducing the cost of maintenance of railroad equipment. Obviously the smaller the number of parts in a car or locomotive, the less the likelihood of their getting out of adjustment and causing trouble. It would not be quite fair to say that Mr. Loree made an obsession of this, but he was deeply concerned to see how far the number of parts in a given piece of equipment could be reduced. With him it was almost like playing a game to see how many parts could be eliminated when a new order for a class of cars or locomotives was put through. Every bolt, every nut, every rivet, every pin was counted as a part. If a casting could supplant a built-up structure, or if welding could be used, it meant a real gain. Sight was not lost, however, of the fact that this must not be carried so far as to interfere with the ready replacement of a part that was liable to be easily damaged or broken. I do not know, but I am wondering how far the "playing of this game" was responsible for Mr. Loree's persistent fight to introduce the all-welded locomotive boiler, which, incidentally, seems to have given an excellent account of itself. Naturally a government bureau is inclined to be over-cautious about countenancing any new development that may cause trouble. It is so much easier to be conservative than to stick one's neck out. At any rate, it took a lot of hard fighting on Mr. Loree's part to get permission to have such a boiler built and placed in service, and he is entitled to much credit for this innovation, although apparently the government is still keeping thumbs down on extending its use. Mr. Loree must also be given credit for the Delaware & Hudson experiments with high-pressure steam locomotive boilers. By many he was regarded as a member of the old school of railroad executives—a natural born fighter and a bit ruthless. But behind his gruff exterior was a big heart. His thoughtfulness for his men and their old age, his attempts to stabilize employment, and his keenness about the training of the workers marked him as one in the front ranks in the field of human relations in industry, though it must be admitted that this was not very generally recognized.

Human Limitations

One of the pathetic things that sometimes occur in these days of great organizations and multiplicity of duties is the fact that men of outstanding ability find themselves at the head of organizations of all sorts of experts whose findings they must pass upon and sponsor. No fair person will question the ability or fairness of Chairman Eastman of the Interstate Commerce Commission, formerly Federal Co-ordinator of Transportation. In the latter capacity he was faced with a tremendous amount of detail and quite naturally had to delegate a lot of responsibility to subordinates. He seems to have had almost unlimited confidence in them; or at least that would appear to be so, judging from some of their reports to which he subscribed and passed on to the public. This applies to the report on "Public Aids to Transportation." The Association of American Railroads has prepared a 16-page booklet in two colors, which points out the fallacies in his statements about the claim of over-payment by highway users. The Railway Age heads a news item about the booklet with the caption "Ethiopians in the Woodpile of Mr. Eastman's Scholarship."



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Keep the defense program rolling . . . .

Photo courtesy Southern Pacific Company

. . . with MODERN POWER

American industry is being called upon now to prepare for the most intensive production effort it has ever made. Production and transportation facilities will be pivot points on which this effort will hinge.

The Lima Locomotive Works is ready to supply the railroads with MODERN POWER . . . . power capable of moving heavier loads at the higher speeds that will be demanded.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS INCORPORATED, LIMA, OHIO

NEWS

B. & M. Tries Experimental Diesel Freight Locomotive

THE big Diesel-electric freight locomotive developing 5,400 engine hp. built by the Electro-Motive Corporation at the beginning of the year for experimental operation and since operated on a number of roads, chiefly in the West, moved onto the lines of the Boston & Maine on September 5, where it has been used on trial runs on fast through freight trains. The locomotive, which consists of two locomotives of two units each coupled back to back, is 193 ft. long and weighs 912,000 lb. Its first job on the Boston & Maine was to haul a 4,500-ton, 83-car freight train in record-breaking time from the Mechanicville (N. Y.) yards to Somerville, Mass.

50-Ft. Box Cars Getting Scarce

BECAUSE of the "evident necessity for a general tightening up in the handling of 50-ft. box cars," Chairman W. C. Kendall of the Car Service Division, Association of American Railroads, has sent out a circular requesting all railroads to issue specific instructions "to your local people in order that all concerned in active car handling may be properly informed." In another place the circular suggests that "in any planning for additional equipment careful consideration should be given to the possible need for increasing the supply of 50-ft. cars."

"With car loadings gradually increasing week by week, the demands on the box car supply are growing proportionately," Mr. Kendall said. "A considerable volume of closed car traffic requires 50-ft. cars, particularly long-haul business from the far West, as well as an increasing amount of traffic in the East and Southeast. There is evidence already of much national defense traffic for which the large cubical capacity box cars will be required and this type of loading will rapidly increase through the Fall and Winter into next year."

"Quiz on Railroads and Railroading"

THE Association of American Railroads has recently issued for free public distribution a 68-page booklet entitled "Quiz on Railroads and Railroading" which contains 400 questions and answers on practically every query that a layman can make. Dedicated "to the curiosity of the American people" and published, among other reasons, for the relief of railroad men and women who are plied with questions every hour of the day, the booklet contains a number of fine "atmosphere" photographs and a complete detailed index which tracks down items by every conceivable reference and cross-reference.

Questions are classified according to theme. The book opens with general questions like: "What is the maximum grade on main line track?"; "What is the highest altitude reached by a railroad line in the United States?", and "What is the longest railroad curve in the United States?" Then come questions of a more technical nature such as "What is a de-

(*Continued on second left-hand page*)

Orders and Inquiries for New Equipment Placed Since the Closing of the September Issue

LOCOMOTIVE ORDERS

Road	No. of locos.	Type of loco.	Builder
Baltimore & Ohio	7	2,000-hp. Diesel-elec.	Electro-Motive
Boston & Maine	3[1]	4-8-4 type	Baldwin Loco. Wks.
Chattanooga Traction Co.	2	350-hp. Diesel-elec.	General Elec. Co.
C. M. St. P. & P.	3	1,000-hp. Diesel-elec.	Electro-Motive Corp.
	9	600 hp. Diesel-elec.	
	4	1,000-hp. Diesel-elec.	American Loco. Co.
	2	1,000-hp. Diesel-elec.	Baldwin Loco. Wks.
C. St. P. M. & O.	2	Diesel-elec.	Electro-Motive Corp.
	1	Diesel-elec.	American Loco. Co.
D. M. & I. R.	8[2]		Baldwin Loco. Wks.
E. J. & E.	2	1,000-hp. Diesel-elec.	Electro-Motive Corp.
	6	600-hp. Diesel-elec.	
	2	1,000-hp. Diesel-elec	American Loco. Co.
	2	600-hp. Diesel-elec.	
	3	660-hp. Diesel-elec.	Baldwin Loco. Wks.
Gulf, Mobile & Ohio	2[3]	2,000-hp. Diesel-elec.	American Loco. Co.
Seaboard Air Line	1[3]	2,000-hp. Diesel-elec.	Electro-Motive
United States Navy Dept.	1	Diesel-elec.	Gen. Elec. Co.

LOCOMOTIVE INQUIRIES

Southern	2	600-hp. Diesel-elec.	.....

FREIGHT CARS

Road	No. of cars	Type of car	Builder
Atlantic Coast Line	600	Auto-box	Pull.-Std. Car Mfg. Co.
	15	Covered hopper	
	100	Auto. furniture	Mt. Vernon Car Mfg. Co.
	50	Stock	
	500	Hopper (coal)	Bethlehem Steel Co.
	200	H. S. gondolas	
	100	Gondolas (phosphate rock)	
	125	Flat	Greenville Steel Car Co.
Canadian Pacific	100	Drop-end gondolas	Canadian Car & Fdry. Co.
	100	Drop-end gondolas	National Steel Car Co.
	300	Hopper	
Chicago, Indianapolis & Louisville	100[4]	50-ton hopper	Pull.-Std. Car Mfg. Co.
C. R. I. & P.	800	Box	Pressed Steel Car Co.
	200	50-ton box	American Car & Fdry. Co.
	100	Drop-end gondolas	Pull.-Std. Car Mfg. Co.
Erie	325	Mill-type gondolas	Company shops

FREIGHT-CAR INQUIRIES

D. M. & I. R.	100	50-ton gondolas	.....
	30	50-ton ballast	.....
	10	70-ton hopper	.....
Southern	1,500	40-ton box	.....
	750	50-ton hopper	.....
	500	H. S. 50-ton gondolas	.....
	250	L. S. 50-ton gondolas	.....
Union Pacific	2,000	Underframes[5]	.....

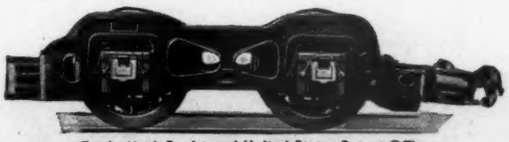
PASSENGER-CAR ORDERS

Road	No. of cars	Type of car	Builder
Canadian Pacific	10	Bagg.-exp.	Canadian Car & Fdry. Co.
	25	Steel frames[6]	
Pennsylvania	3[7]	Coaches	Edw. G. Budd
Seaboard (in conjunction with Pennsylvania)	10	Coaches	Edw. G. Budd[8]
	2	Diner-lounge	
	3	Tavern-obser.	
	3	Pass.-bagg.-domitory	

[1] To cost approximately $160,000 each.
[2] Delivery taken. For "Rebel" service.
[3] Total value approximately $2,000,000. To haul "Silver Meteor" equipment between New York and Florida. The locomotive ordered was built last year and is now on display at the General Motors' exhibit at the New York World's Fair.
[4] In addition to 100 reported in the September issue.
[5] For box cars to be built in company shops.
[6] For first-class coaches to be built at Angus shops.
[7] Lightweight stainless-steel coaches to be operated jointly with the 17 similar units ordered by the Atlantic Coast Line, as reported in the September *Railway Mechanical Engineer*.
[8] To go into service between New York and both coasts of Florida starting in the late fall.

CARLOADINGS ARE ALREADY UP!

Already the preliminary stages of the defense program have resulted in an increase in carloadings. When the program is under full swing the railroads will be faced with a hauling problem such as they have not faced in years. » » » The quickest and most economical means of meeting the demand of moving heavier loads at high speeds with your existing locomotives is . . . BOOSTER* POWER! The Locomotive Booster, by capitalizing idle weight and spare steam, enables you to start heavier loads and keep them moving over the ruling grades. Increase the capacity of what already exists by adding the Booster.



*Trade Mark Registered United States Patent Office

FRANKLIN RAILWAY SUPPLY COMPANY, INC.

NEW YORK
CHICAGO
MONTREAL

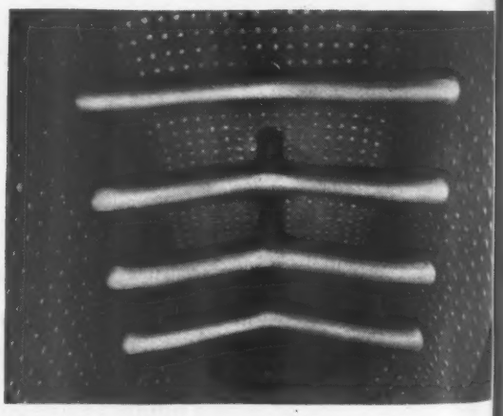
7 Million Miles

OF SUCCESSFUL OPERATION

HAVE PROVED

THE SECURITY CIRCULATOR

564 Security Circulators (371 of which were installed during the past 12 months) are operating on 20 railroads and have accumulated over 7 million locomotive miles, mostly in heavy, fast freight and passenger service. » » Some of these Circulator-equipped locomotives have operated over 300,000 miles. » » The Security Circulators in service have proved so successful that repeat orders are constantly being placed.

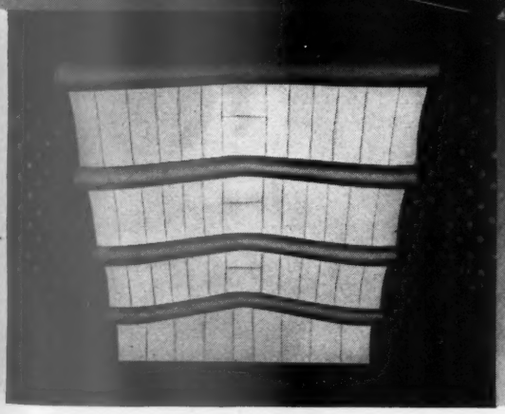


View illustrating the positioning of Security Circulators in an average size of locomotive firebox prior to installing the brick arch.

AMERICAN ARCH

Security Circulator Division

Firebox of one of ten 4-8-4 type locomotives recently built for a mid-western road — all equipped with Security Circulators.



Typical Security Circulator and brick Arch Installation in a locomotive firebox. The small sectional brick are as readily applied as in an ordinary arch tube firebox.

★ Improved Arch Support for the largest fireboxes

★ Adapted to any type of locomotive

★ Reduced honeycombing, flue plugging and cinder cutting

★ Improved circulation in side water legs

COMPANY, INC.

NEW YORK CHICAGO

questions range from the simplest—as "What is a railroad cut?"—to a discussion of the handling of disputes between railroads and their employees. The cover painting is taken from the latest calendar issued by the Committee on Public Relations of the Eastern Railroads.

Equipment Purchasing and Modernization Programs

Bessemer & Lake Erie.—Work will be carried out by company forces on an extension to machine and erecting shop and rearranging conduits and pipe lines at Greenville, Pa., at a cost of approximately $72,000.

Canadian National.—A contract has been awarded to the Fundy Construction Company, Ltd., Halifax, N. S., for the construction of a new locomotive enginehouse at Fairview, N. S.; estimated cost $100,000.

Chicago, Rock Island & Pacific.—New terminal facilities for handling Rocket trains to be placed in service this fall between Memphis, Tenn., and Amarillo, Tex., are being constructed at Memphis at a cost of approximately $32,000. The new facilities will consist of a transfer table, a drop pit, two inspection pits, an 8,000-gal. fuel oil tank and water, steam and air extensions.

Duluth, Missabe & Iron Range.—This road has applied to the Interstate Commerce Commission for authority to assume liability for $1,500,000 of 1½ per cent equipment trust certificates to finance in part the acquisition of rolling stock to cost $2,089,200.

Seaboard Air Line.—The S. A. L. has asked the Interstate Commerce Commission to approve a plan whereby the Reconstruction Finance Corporation would either guarantee or purchase $1,120,000 of three per cent equipment trust certificates, maturing in 14 equal annual installments beginning November 1, 1941. The proceeds would be used to finance in part the purchase of 15 streamline passenger cars, 50 70-ton all-steel hopper cars, and one 2,000 h.p. Diesel-electric locomotive unit, costing a total of $1,373,475. The petition states that the passenger cars will be purchased from the Edward G. Budd Manufacturing Company, the hopper cars from the Pullman-Standard Car Manufacturing Company, and the locomotive unit from the Electro-Motive Corporation.

Supply Trade Notes

J. G. FORSTER, vice-president of the Ogle Construction Company, Chicago, has also been elected vice-president in charge of sales of the Union Railway Equipment Company, Chicago.

◆

ROBERT G. ALLEN, whose election as president and a director of The Duff-Norton Manufacturing Company, Pittsburgh, Pa., was announced in the September *Railway Mechanical Engineer*, was born in Winchester, Mass., on August 24, 1902. He attended Phillips Academy, Andover, and Harvard University, majoring in economics, and taking post-graduate work at Harvard Business School. Upon completion of his college courses, Mr. Allen obtained a job with the Walworth Company in South Boston, Mass., entering the foundries as a laborer to learn this phase of the business. From that department, he went to the machine shops, and then up through the other divisions of the company. In 1927, he was sent to Columbus, Ohio, to represent the Walworth Company in the sales field, and two years later was appointed sales manager, with headquarters at Greensburg, Pa. In 1936, Mr. Allen resigned to become a candidate for Congress. He was elected and served in the National House of Representatives for four years, during which period he served as a member of the Foreign Affairs Committee. After his re-election in 1938, he notified his constituents that he would leave public life at the expiration of his term and on July 15, 1940, he was elected president of the Duff-Norton Manufacturing Company, Pittsburgh, and also of its subsidiary company, the Canadian Duff-Norton Company, Ltd., Coaticook, Que.

Robert G. Allen

◆

THE BETTENDORF COMPANY, Bettendorf, Iowa, is rearranging and modernizing its plant facilities to increase and accelerate production. Core rooms, molding and shake-out rooms are being moved and re-equipped for assembly line operation. New furnaces are being built, conveyor systems installed and chemical and metallurgical laboratories erected. The cost of the new equipment and the rearranging of facilities is $500,000.

◆

FRANK R. CARLSON, manager of sales of the Chicago Railway Equipment Company, Chicago, has been elected vice-president in charge of railroad sales.

◆

CHICAGO PNEUMATIC TOOL COMPANY.—*P. J. Christy* has been appointed manager of the Philadelphia (Pa.) office of the Chicago Pneumatic Tool Company, succeeding *A. M. Brown*, who has been transferred to Washington, D. C., as manager of a new branch opened in that city recently. *C. A. Diehl* has been appointed manager of the Houston (Tex.) office.

◆

GISHOLT MACHINE COMPANY.—*George M. Class*, chief engineer of the Gisholt Machine Company, Madison, Wis., has been appointed vice-president in charge of engineering. *Frederick L. Chapman*, assistant sales manager, has been appointed sales manager. *Roy Hunter* and *P. Robert Foseid* have been appointed to the sales force, Mr. Hunter being located at Cleveland, Ohio, and Mr. Foseid at Newark, N. J.

THE GOLD CAR HEATING & LIGHTING CO., located at 220 36th Street, Brooklyn, N. Y., for the last 20 years, is moving its offices to 33 Thirty-fifth Street in the same city.

◆

J. B. EMERSON, formerly engineer of tests for the rail committee of the American Railway Engineering Association and later associated with the passenger car axle research conducted by the A. A. R., Mechanical division, at the Timken Roller Bearing Company's laboratory at Canton, Ohio, has become affiliated with the Pittsburgh Testing Laboratory's railroad inspection department, with headquarters in Chicago.

◆

JOHN E. STAPLETON, assistant to the vice-president in charge of sales of the Carnegie-Illinois Steel Corporation, has been appointed assistant manager of sales,

John E. Stapleton

New York district. Mr. Stapleton attended the University of Cincinnati (Ohio) and entered service with the Carnegie Steel Company in 1917. From 1921 to 1926 he served as a salesman in the Kentucky coal fields, and for the next eight-year period

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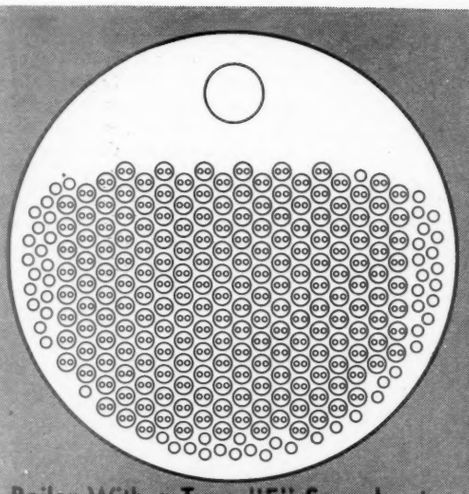
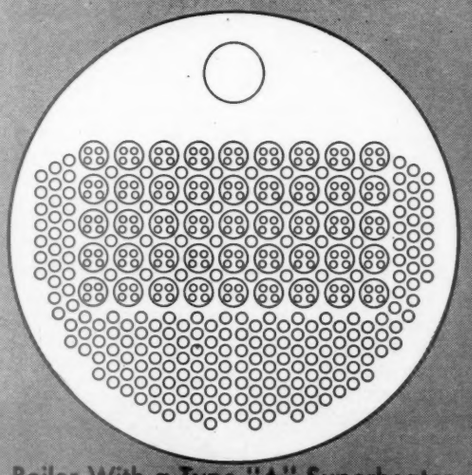
Maximum Boiler Horsepower



Boiler With a Type "E" Superheater

ITEM	SUPERHEATER Type "A"	SUPERHEATER Type "E"	Increase	Increase Per Cent
Tube and flue heating surface...	4,200 sq. ft.	4,641 sq. ft.	441 sq. ft.	10.5
Superheating surface	1,164 sq. ft.	2,088 sq. ft.	924 sq. ft.	79.3
Gas area	1,337 sq. in.	1,374 sq. in.	37 sq. in.	2.76
Steam area	51.3 sq. in.	67.06 sq. in.	15.76 sq. in.	30.7



Boiler With a Type "A" Superheater

The steam generating capacity of a boiler is directly proportional to the amount of evaporating surface in square feet for equal length of tubes.

The tabulation compares two typical boilers in actual service, with the same outside diameter and length, as illustrated, one designed for the Type "E" superheater and the other for the Type "A" superheater.

The increase in evaporating and superheating heating surfaces made possible with the Type "E" superheater design in the same size of boiler, is substantial and is responsible for an increase in the steam generating capacity of the boiler.

Specify boilers with Elesco Type "E" superheaters for maximum boiler horsepower.

ELESCO

SUPERHEATERS • FEEDWATER HEATERS
AMERICAN THROTTLES • STEAM DRYERS
EXHAUST STEAM INJECTORS • PYROMETERS

THE SUPERHEATER COMPANY

Representative of
AMERICAN THROTTLE COMPANY, INC.
60 East 42nd Street, NEW YORK
122 S. Michigan Ave. CHICAGO
• • •
Montreal, Canada
THE SUPERHEATER COMPANY, LTD.

was resident salesman at Columbus, Ohio. He was resident salesman at Youngstown, Ohio, from 1934 to 1936, when he was appointed assistant to the manager of sales, with headquarters at Chicago. In February, 1938, he became assistant to the Carnegie-Illinois vice-president in charge of sales.

◆

J. THOMAS TALBOT, assistant to the president of the Brake Shoe and Castings Division of The American Brake Shoe and Foundry Company, has been appointed vice-president in charge of eastern sales of this division and of the Southern Wheel Division. After graduating from the McDonogh School, Baltimore, Md., in 1913, Mr. Talbot entered the service of the Baltimore & Ohio as a special apprentice, later serving as a machinist and locomotive inspector. In May, 1917, he enlisted in the 19th Engineers (railway), serving nineteen months overseas and receiving a commis-

J. Thomas Talbot

sion as second lieutenant. In March, 1919, he returned to the service of the B. & O. in the Cumberland, Md., shops. In June, 1920, he became an inspector in the employ of the American Brake Shoe and Foundry Company, with headquarters in New York. In 1923 he went to Norfolk, Va., as sales manager, and in 1935 returned to the New York office. In January, 1939, he was appointed assistant to the president of the American Brake Shoe and Castings Division.

◆

THE WHITING CORPORATION, Harvey, Ill., announces that it has acquired the 29-year-old Quickwork Company, manufacturers of rotary shears, stamping trimmers and forming machines, power hammers, throatless shears and flangers, formerly of St. Marys, Ohio, and Chicago. Stevens H. Hammond, vice-president of Whiting, will be in charge of all Quickwork operations, while Paul V. Hyland, formerly of the Industrial division of Whiting, has been appointed sales manager of the Quickwork line. B. W. Packer, formerly of the Quickwork Company, will join the new organization as chief engineer and S. M. Steinko will be in charge of advertising. All Quickwork products will be manufactured by the Whiting organization at its plant at Harvey.

Obituary

D. M. SMITH, assistant district sales manager, Chicago office of the Allegheny Ludlum Steel Corporation, died recently at his home in Chicago. Prior to the merger with Ludlum, Mr. Smith was district sales manager for the Allegheny Steel Company.

◆

WILLIAM B. HALL, president of the Union Railway Equipment Company, Chicago, died in that city on July 31. Mr. Hall was born in Nebraska City, Neb., on April 12, 1872. He entered railway service in 1891 in the operating department of the Chicago, Burlington & Quincy at Chicago and three years later resigned to accept a position with the Continental Illinois National Bank in Chicago. In 1896, he entered the employ of the Mather Stock Car Company in charge of purchases and production. Mr. Hall remained in the employ of this company until 1911. In 1912, he and two partners organized the Union Railway Equipment Company, Chicago. Subsequently, Mr. Hall acquired their interests.

◆

GEORGE N. VAN SWERINGEN, vice-president in charge of sales of the Chicago Railway Equipment Company, died on September 3 at Evanston, Ill. Mr. Van Sweringen was born at Ft. Wayne, Ind.,

George N. Van Sweringen

on April 9, 1875. He entered railway service with the Pennsylvania at Ft. Wayne, and later was employed by the Chicago, Rock Island & Pacific. In 1909, he became a sales representative for the Chicago Railway Equipment Company, and in 1926 was promoted to assistant to the president, which position he held until July, 1935, when he was elected vice-president in charge of sales.

◆

ABRAM LADUE WHIPPLE, district sales manager of The Standard Stoker Company, Inc., at New York, died on August 10. Mr. Whipple was born in Albany, N. Y., in 1872 and was educated at Highland grammar school, West Sommerville, Mass. He entered railway service in 1888 as telephone operator on the Fitchburg (now the Boston & Maine) and subsequently became chief clerk to the purchasing agent of that road. In 1892 he entered the railway supply business as a salesman for the Hopewell Railroad Supply Co., Boston, Mass., and later went with the Boston Woven Hose & Rubber Co. In 1895 he re-entered railroad service as assistant superintendent of the Hoosac Tunnel & Wilmington, Wilmington, Vt. Several years later he returned to the railway supply business as sales manager of the E. T. Burrowes Co., Portland, Me., which firm was later purchased by Chicago curtain interests and is now a part of Adams & Westlake Co. Subsequently he became assistant sales manager, Forsyth Brothers Co., Chicago, and later sales manager and vice-president of the Railway Equipment Company of New York (now Waugh Equipment Co.). In 1925 Mr. Whipple was appointed a representative of the Locomotive Stoker Company of Pittsburgh (Pa.) and became district sales manager of the Standard Stoker Co., Inc., at New York, in 1928, when the latter company purchased the patents of the Locomotive Stoker Company.

A. L. Whipple

◆

JOHN E. WARD, who was for many years associated with the car heating equipment business before his retirement in 1918, died at his home in Hackensack, N. J., on August 5, at the age of 65. He was born at Poughkeepsie, N. Y., on June 3, 1875, and rose through the ranks of the Gold Car Heating & Lighting Co. to become a vice-president. He resigned from the latter position in May, 1907, to form the Ward Equipment Company, manufacturers of heating and ventilating equipment, of which he became president. He later joined the Standard Heat & Ventilation Co., upon its absorption of the Ward Equipment Company, and in 1917 became an officer of the Vapor Car Heating & Lighting Co., which was an amalgamation of the Chicago Car Heating Company and Standard.

◆

CHARLES A. ROWAN, chairman of the board, of the Westinghouse Air Brake Company and the Union Switch & Signal Co., Wilmerding, Pa., died on September 13, at the age of 65, after several weeks' illness. Born in Pittsburgh, Pa., in 1874, Mr. Rowan was educated in the public schools of Pittsburgh and at Parnassus Academy. He began his business career as a bookkeeper at Logan's Planing Mills,

and two years later, in 1894, became a clerk in the employ of the East Pittsburgh Improvement Company. In 1902 he went with the East Pittsburgh National Bank. In 1903 he entered the service of the Westinghouse Air Brake Company, with which company he had since been engaged as assistant auditor, 1903-1909; acting assistant treasurer, 1909-1910; auditor, 1910-1916; comptroller, 1916-1919. In 1918,

C. A. Rowan

while comptroller, he was elected also vice-president. From 1930 to 1932 he was executive vice-president of Westinghouse, and from 1932 to 1936 was its president. During these latter years Mr. Rowan was also connected with subsidiaries of Westinghouse. In 1927 he became president of Westinghouse International Brake & Signal Co., which position he held until the dissolution of that organization in 1936. In 1929 he was also elected a director of Westinghouse and its affiliated Union Switch & Signal Co. Since 1936, Mr. Rowan had been chairman of the boards of Westinghouse and Union Switch.

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CHARLES A. CAMPBELL, engineer of tests, New York Air Brake Company, with headquarters at Watertown, N. Y., died of a

Charles A. Campbell

heart ailment at Watertown on September 4. Mr. Campbell was born in Harrisville, N. Y., in 1893, and received his early education in Montreal, Que. During school vacation periods as a medical student, he served as an apprentice draftsman with Allis Chalmers and Bullock, Ltd., where he became interested in mechanical engineering and adopted it as his profession. In 1910 he became a draftsman with the New York Air Brake Company, and a few years later was selected as an apprentice for the Experimental department, where he found background for the position of engineer of tests which he assumed in 1925 and held until his death. Mr. Campbell was honored as one of the nation's "modern pioneers" by the National Association of Manufacturers last February when it was brought out that he was the recipient of a total of 123 patents granted to him solely or jointly and had entered application for 16 additional grants. Among his outstanding contributions to the science of railroading are the development of a graduating type of retardation controller, known commercially as the Decelakron, and the electro-pneumatic straight-air controlled brake system. Other of his patents have influenced the development of the modern air brake for freight service, known as the AB brake, which has been adopted by the railroads for application to all cars in interchange service by 1945.

◆

C. M. HOFFMAN, who retired as vice-president of the Dearborn Chemical Company, Chicago, in 1936, died in Los Angeles, Cal., on September 9. Mr. Hoffman

C. M. Hoffman

was born in Moncton, New Brunswick, on July 29, 1870. He entered railway service as an apprentice on the Chicago, Burlington & Quincy at St. Joseph, Mo., and after serving as a machinist and foreman he was promoted to road foreman, from which position he resigned to become master mechanic of the Southern at Princeton, Ind. Five years later he became superintendent of motive power of the St. Louis, Brownsville & Mexico at Kingsville, Tex., and after another five years became master mechanic for the United Verde Mines at Clarkdale, Ariz. Later he served as master mechanic of the Denver & Rio Grande Western at Grand Junction, Colo.; master mechanic for the Utah Copper Company and superintendent of motive power of the Los Angeles & Salt Lake. In 1924, he resigned from the latter position to become Dearborn assistant to the vice-president of the Dearborn Chemical Company. In 1928 he was appointed vice-president in charge of railway sales.

◆

GEORGE E. SPENGLER, who had represented The Superheater Company and several other supply companies for many years in the Far East, died on August 9, in a San Francisco, Calif., hospital after a brief illness. He had just returned from China. Mr. Spengler was born in Chicago in 1882, and after attending schools in Chicago entered the service of the Chicago & North Western, becoming road foreman of engines. He left the service of the railroad to become a traveling engineer for The Superheater Company and during 1917 traveled to Russia as service representative in connection with the shipment of American-built locomotives. On his return to the United States he joined the Stevens Commission to investigate railroads in Manchuria. Thereafter, he made his home in China as representative of The Superheater Company and other American firms.

◆

O. W. BUENTING, vice-president in charge of manufacture of the Westinghouse Air Brake Company and the Union Switch & Signal Co., died on July 27, at Lewes, Del., after a brief illness. He had been vacationing at Rehoboth Beach. Mr. Buenting learned the machinist's trade on the Chicago, Burlington & Quincy at Wymore, Neb., and thereafter worked for several years in the shops of several western roads. In 1901 he was graduated from Purdue University with a degree in mechanical engineering; the subject of his thesis was the air brake. Immediately after graduation he entered the employ of the Westinghouse Air Brake Company as a special apprentice, and six years later became general superintendent of the Wil-

O. W. Buenting

merding (Pa.) plant in 1907. In 1917 he was promoted to works manager and in 1926 was appointed general manager of works for the air brake company and its subsidiaries. In 1930, Mr. Buenting was elected vice-president in charge of manufacture and in the same year was elected to a corrsponding position with the Union Switch & Signal Co., which position he held until his death.

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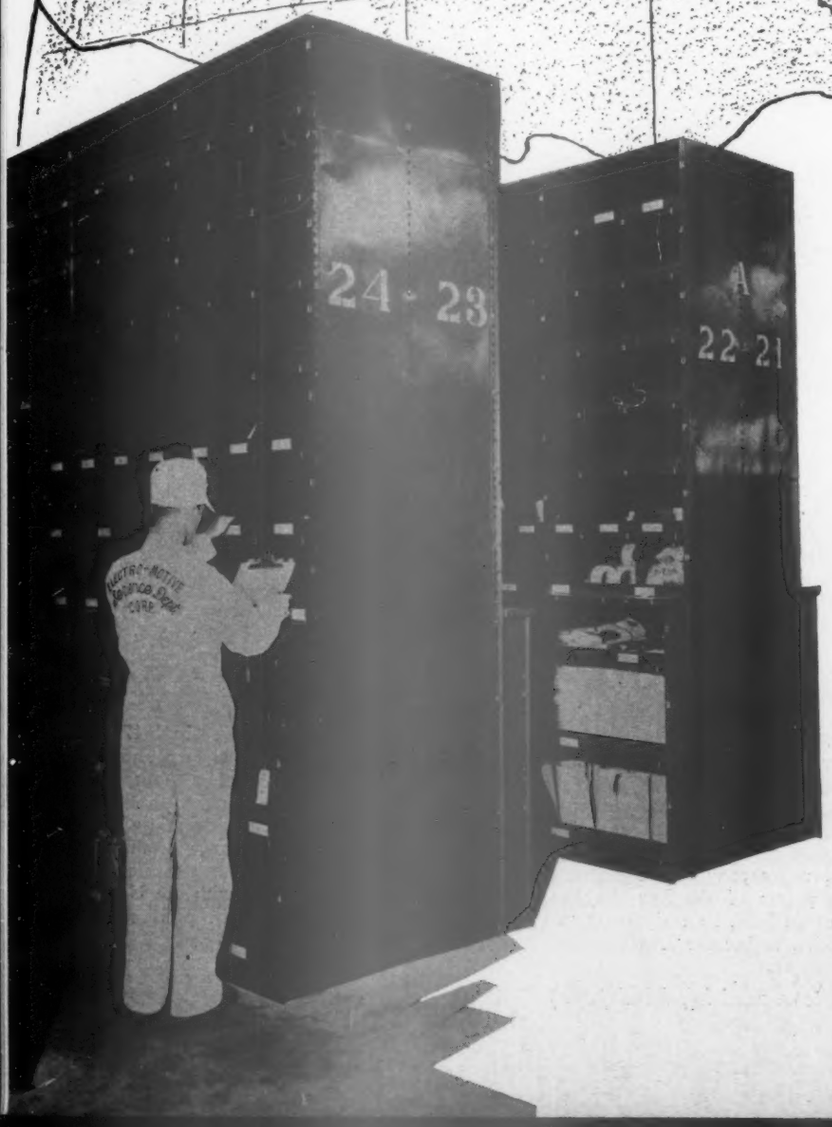
EMC SERVICE Simp



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ELECTRO-MOTIVE CORPORATION
SUBSIDIARY OF GENERAL MOTORS LA GRANGE, ILLINOIS, U. S. A.

Personal Mention

General

OTTO C. GRUENBERG, of the American Locomotive Company, has been appointed superintendent motive power of the New York, Ontario & Western and the New York, Susquehanna & Western.

L. W. DOWNEY, supervisor of automotive equipment of the Chicago Rock Island & Pacific, in charge of the maintenance of Diesel engines, has been granted a leave of absence, effective September 1, to serve as engineer of maintenance of the Diesel section of the Bureau of Ships of the U. S. Navy.

W. JOSEPH CRABBS has been appointed mechanical engineer of the Western Maryland, with headquarters at Hagerstown, Md., succeeding his father, William J. Crabbs, deceased. The newly appointed mechanical engineer was born on September 5, 1912, at Hagerstown and was graduated from Virginia Polytechnic Institute, Blacksburg, Va., with a B. S. degree in 1934. He entered railway service during the summer of 1927 with the Western Maryland and served during subsequent summers until 1933 as special apprentice. From June, 1934, to August, 1935, Mr. Crabbs served as special apprentice with the American Locomotive Company at Schenectady, N. Y. On August 1, 1935, he became draftsman for the Western Maryland and on March 8, 1938, he was promoted to chief draftsman, the position he held until his recent appointment.

W. Joseph Crabbs

Car Department

D. W. AKINS, general car inspector of the Texas & Pacific at Dallas, has been appointed superintendent of the car department.

WILLIAM SCHMALZRIED, superintendent of the car department of the Texas & Pacific at Dallas, Tex., has retired at his own request.

J. D. CLYDE, general foreman of the locomotive department of the Texas & Pacific at Ft. Worth, Tex., has become general car inspector at Dallas, Tex.

LEONARD R. SCHUSTER, whose promotion to engineer of car construction of the Southern Pacific, with headquarters at San Francisco, Calif., as announced in the August *Railway Mechanical Engineer*, was born at Napa City, Calif., on March 12, 1883, and studied a correspondence school course in mechanical engineering. He entered railway service in December, 1901, in the passenger car department at Sacramento, Calif., and in January, 1907, was transferred to drafting work in the motive power department at San Francisco. In 1915, after advancing through several positions, he was promoted to assistant chief car draftsman and three years later he was advanced to chief freight car draftsman. Mr. Schuster was promoted to chief car draftsman in 1924, the position he held until his recent promotion.

Leonard R. Schuster

Master Mechanics and Road Foreman

S. G. MATTICE, traveling fireman on the Canadian National at Saskatoon, Sask., has been promoted to master mechanic at that point.

G. H. WARNING, master mechanic of the Canadian National at Saskatoon, Sask., has been transferred to Regina, Sask.

Shop and Enginehouse

H. L. GEIDENBERGER, division foreman of the Baltimore & Ohio at Washington, Ind., has become superintendent of shops at Ivorydale, Ohio.

R. D. BRITTON, assistant locomotive foreman of the Canadian National at Jasper, Alta., has been appointed locomotive foreman at Calgary, Alta.

H. KONSIT, assistant locomotive foreman of the Canadian National at Vermillion, Alta., has become assistant locomotive foreman at Jasper, Alta.

Purchasing and Stores

A. R. MULLENS, assistant general storekeeper on the Union Pacific at Pocatello, Idaho, has been transferred to Omaha, Neb. The position of assistant general storekeeper at Pocatello has been abolished.

J. L. IRISH, assistant general storekeeper on the Union Pacific at Omaha, Neb., has been promoted to general storekeeper, with the same headquarters, succeeding U. K. Hall, whose retirement on March 31, was announced in the April issue of the *Railway Mechanical Engineer*.

E. O. HORNIG, assistant to vice-president in charge of purchases and stores, of the New York Central System, at New York, has been appointed assistant purchasing agent of the New York Central, the Indiana Harbor Belt and the Chicago River & Indiana, with supervision over the purchase of miscellaneous materials to be assigned.

E. S. BONNET, fuel purchasing agent of the New York Central and the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at New York, has been appointed first assistant purchasing agent of the New York Central, the Indiana Harbor Belt and the Chicago River & Indiana, at New York, with supervision over the purchase of fuel coal and forest products.

Obituary

J. C. LEWIS, road foreman of engines of the Richmond, Fredericksburg & Potomac and past president of the Railway Fuel and Traveling Engineers' Association, died of heart failure on September 18 at Richmond, Va.

WILLIAM J. CRABBS, mechanical engineer of the Western Maryland, with headquarters at Hagerstown, Md., died suddenly on August 13 from a heart attack, at the age of 61. Mr. Crabbs was born in Carroll County, Md., on June 12, 1879, and was graduated in mechanical drawing from the Maryland Institute for the Promotion of Mechanical Arts in 1905. He taught school from 1897 to 1902 and entered railroad service on May 22, 1902, as machinist apprentice on the Western Maryland, serving in that capacity until 1905, when he became draftsman. From 1907 to 1916, he was chief draftsman and from 1916 to 1917, motive power clerk. Mr. Crabbs was appointed mechanical engineer in 1918, the position he held until his death. He was a member of the Mechanical Division of the Association of American Railroads.